MAY 3 1923 Medical Lib.

Northern Minnesota Medical Association Meeting

Alexandria, June 4, 5, 6, 1923

VOLUME VI NUMBER 5

MINNESOTA MEDICINE

Journal of the Minnesota State Medical Association, Southern Minnesota Medical Association Northern Minnesota Medical Association and Minneapolis Surgical Society

EDITOR

CARL B. DRAKE, M.D., St. Paul

ASSISTANT EDITORS

STANLEY R. MAXEINER, M.D., Minneapolis EVERETT K. GEER, M.D., St. Paul

ASSOCIATE EDITORS

First District
GEO. S. WATTAM, M.D., Warren

Second District
F. H. KNICKERBOCKER, M.D., Staples

Third District
E. L. TUOHY, M.D., Duluth

Fourth District
F. L. ADAIR, M.D., Minneapolis

Fifth District
GEO. B. WEISER, M.D., New Ulm

Sixth District
F. M. MANSON, M.D., Worthington

Seventh District
H. B. AITKENS, M.D., Le Sueur Center

Eighth District
F. P. STRATHERN, M.D., St. Peter

MAY 1923

CONTENTS

ORIGINAL ARTICLES:

GEORGE J. HEUER, M.D., Cincinnati—Lung Abscess 279
ARTHUR T. MANN, M.D., F.A.C.S., Minneapolis—Diaphgramatic Hernia 285
H. LONGSTREET TAYLOR, M.D., St. Paul—The Tuberculosis Crusade in Minnesota 291
ROBINSON BOSWORTH, M.D., St. Paul—Minnesota's Anti-Tuberculosis Campaign 296
WILLIS S. LEMON, M.D., Rochester—The Status of Present-Day Methods of Examination in the Diagnosis of Intestinal Tuberculosis 300
WALTMAN WALTERS, M.D., Rochester—Surgical Treatment of the Ureter in Tuberculosis of the Kidney 307
C. EUGENE RIGGS, M.D., St. Paul—A Case of Acute Delirium Apparently Due to Bromidia Poisoning 310
E. STARR JUDD, M.D., Rochester—Ulcer of the Stomach and Duodenum 311
J. L. ROTHROCK, M.D., St. Paul—Dysmenorrhea 314
JOSEPH C. MICHAEL, M.D., Minneapolis—Mental Aspects in Delinquency 319
MORRIS I. BIERMAN, B.S., M.D., St. Louis—The Roentgen Rays in Thyroid Therapy 322

(Continued on Advertising Page III)

Owned and Published Monthly by

THE MINNESOTA STATE MEDICAL ASSOCIATION

BUSINESS MANAGER
J. R. BRUCE, 403 Central Bank Bldg., Saint Paul
Telephone: N.W. Cedar 1683
210 Commercial Bldg., Minneapolis
Telephone: Atlantic 2716

Entered at the Post Office in Saint Paul as second class mail matter.
Accepted for mailing at the special rate of postage provided for in Section 1103, Act of October 3, 1917, authorized July 13, 1918.

Subscription Price { $3.00 yearly, Domestic
$3.50 yearly, Foreign

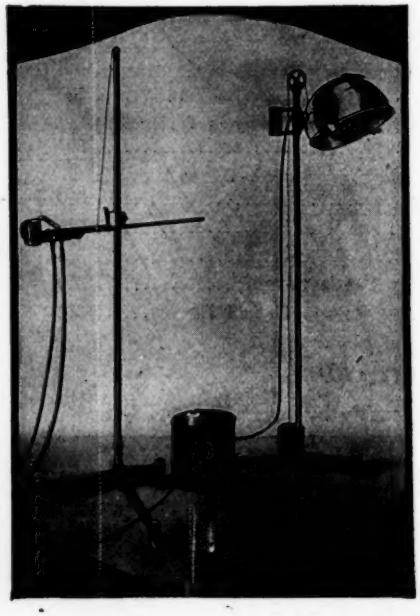
CONTENTS OF THIS PUBLICATION PROTECTED BY COPYRIGHT

HANOVIA QUARTZ LAMPS

ULTRA VIOLET THERAPY covers a broader field of usefulness than any single modality known to the medical profession.

THE ALPINE SUN LAMP and THE KROMAYER LAMP are today the recognized leaders of equipment for the generation of **ULTRA VIOLET RAYS.**

Write for detailed information today



DISTRIBUTED BY

Magnuson X-Ray Co.

DENVER
SALT LAKE CITY
SIOUX FALLS
DES MOINES
KANSAS CITY
OMAHA

SALES AND SERVICE

MINNESOTA MEDICINE

Journal of the Minnesota State Medical Association, Southern Minnesota Medical Association Northern Minnesota Medical Association and Minneapolis Surgical Society

VOL. VI MAY, 1923 No. 5

ORIGINAL ARTICLES

LUNG ABSCESS*

GEORGE J. HEUER, M.D.
Cincinnati

It seems to me fitting, before a gathering of this kind, to discuss lung abscess from other standpoints than purely that of its surgical treatment. Those of you who have been interested in the subject have, I am sure, been impressed during the past six to eight years with the increasing number of cases which have come under your own observation and have noted the great number of cases reported in the literature. The late John B. Murphy[1] was able to collect only seventy-two cases from all causes reported in the twenty years between 1878-1897. In the past five or six years a far greater number have been reported following tonsillectomy alone. But while tonsillectomy has in recent years outstripped every other etiological factor in the causation of this disease—and therefore requires special comment—there are other etiological factors of the same nature which require emphasis; and I wish today to discuss lung abscess from the standpoint of preventive surgery and medicine as well as from the standpoint of its surgical treatment. My remarks are based upon an analysis of sixty-two cases occurring in the service of Dr. Halsted and from a study of the literature.

From the standpoint of etiology, lung abscesses may be divided into a number of groups:

1. *Lung Abscesses Secondary to Tonsillectomy.* Before 1912 almost unknown as a cause of lung abscess, tonsillectomy has since that time come into prominence as the most common cause of this disease. It is not my purpose to discuss whether or not tonsillectomy is too indiscriminately performed, or done by improper methods or by inexperienced specialists. Yet I cannot refrain from some comments which I think may be appropriate. That it is a fact that tonsillectomy is at present the most common cause of lung abscess can be established by anyone who will read the literature on the subject since 1912. In every large and small series of *recently* reported cases it stands out as the foremost cause of this disease and the number of cases reported is rather alarming. Having established this fact we should like to know in what way or ways this popular operation may cause lung abscess. We find a great difference in opinion expressed in the literature. Most general surgeons who have expressed themselves take a simple view of the matter—that lung abscess following tonsillectomy is in the majority of instances due to the aspiration during or after operation of infected blood or particles of tonsils. The majority of nose and throat specialists, while admitting this cause as important, rather incline to believe that the more frequent cause is by embolism and infarction—the septic material about the tonsil entering the blood or lymph channels and being carried thence to the lung. These are the two chief sources of pulmonary infection as expressed in the literature, but other causes have been enumerated, most important of which is the kind and method of anesthesia—whether local or general, and if the latter, whether motor driven or not. In an attempt to correlate the views expressed in the literature I may state certain facts with which everyone is in more or less agreement.

1. Lung abscess follows tonsillectomy and the operation is responsible for the disease.

2. The vast proportion of lung abscesses follow tonsillectomy *done under general anesthesia.* In Fisher and Cohen's[2] collection of seventy-six cases of lung abscess following tonsillectomy, seventy-four had a general anesthetic.

3. Lung abscess does, however, follow tonsillectomy done under local anesthesia but the proportion of cases is small.

4. Lung abscess follows tonsillectomy even when, according to the author's statement, the operation is done with every possible precaution.

*Paper delivered before the Southern Minnesota Medical Society, Rochester, Minn., June 19, 1922.

It would appear from these statements that aspiration of infected material occurring during general anesthesia is the most frequent cause of lung abscess; the supporters of the embolic theory, however, state that local anesthesia lowers the incidence of lung abscess by contracting the vessels about the tonsil and preventing the entrance of infected emboli into the lumina of the vessels. This particular question, however, is largely an academic one and I shall not further discuss it.

The important matter for us is that we have here the most frequent etiological factor at the present time in the causation of lung abscess; and the problem of eliminating this etiological factor is purely a problem in preventive surgery. With the known facts at our disposal we might say that we could very largely solve the problem by agreeing that tonsillectomy should be done only under local anesthesia. Such an agreement if carried out would eliminate perhaps the larger number of lung abscesses but it would not eliminate them all; for there remain the large number of children and the occasional adult who require general anesthesia. Moreover we would be prone to lay too great stress upon general anesthesia as the cause of lung abscess, which might blind us perhaps to more important factors. Crowe[3] and his associates in Baltimore have, since 1911, performed 3,000 tonsillectomies under general anesthesia. The cases have been followed and there has not developed a single instance of lung abscess; and indeed the only pulmonary complications which have followed in the entire series are two cases of presumed broncho-pneumonia, both of which recovered. This series together with the experience of the Mayo Clinic[4] (16,275 tonsillectomies in ten years with no known abscess) demonstrates that tonsillectomy under general anesthesia can be made as safe as by any method. The root of the matter is that it is the surgeon and his methods who is very largely responsible for lung abscesses; and our best method of preventing them is to encourage—and I was going to say insist that—the men who go into nose and throat work get an adequate training in general surgery so that they may be familiar with surgical pathology, surgical technique and the control of hemorrhage, and possess good surgical judgment.

2. *Lung Abscesses Secondary to the Aspiration of Other Foreign Bodies.* An etiological factor not of so great importance as the preceding, yet a perusal of the literature shows a fairly large number of abscesses due to the aspiration of teeth, kernels of grain and other foreign bodies. In our series it was the cause of two abscesses; in Forbes's[5] series, of one; in Whittemore's[6] series of thirty-two cases, of three; in Wessler and Schwartz's[7] series of fifteen cases, of three; and in Hedblom's[8] series of fifty-six cases, of six. Tuffier[9] found this to be the etiological factor in 11 per cent of his collected cases. A fair estimate is I think that 10 per cent of the abscesses reported have been due to the aspiration of foreign bodies. Here then is another field for preventive medicine and surgery. Naturally our preventive measures should take two directions: first and most important, the prevention of the aspiration of foreign bodies so far as this can be prevented, and, second, the prompt removal of foreign bodies after they have been aspirated into the bronchi. We lack at the present time a sufficient number of men trained in the use of the bronchoscope; yet there are medical centers which possess men with surprising skill; and it is our duty to send these patients as promptly as possible to these medical centers.

3. *Lung Abscesses Secondary to Infectious Processes Elsewhere.* I refer here to the lung abscesses secondary to liver abscess, to appendicitis with peritonitis, and to other acute or chronic infections within the abdomen; to mastoiditis; to empyema and other septic conditions. A review of the literature shows a considerable number of lung abscesses due to these conditions. In our own series of sixty-two cases, seven cases followed acute abdominal conditions, including liver abscesses, appendicitis and peritonitis; two followed acute mastoiditis; three septicemia secondary to acute osteomyelitis; and fifteen were associated with empyema. In Hartwell's[10] series of 148 cases, at least forty followed some infectious process elsewhere than in the lungs and five followed acute mastoiditis; in Hedblom's[8] series of fifty-six cases one followed liver abscess, one subphrenic abscess, and four were associated with empyema. It is apparent therefore that a considerable number of abscesses are secondary to infections elsewhere and chiefly to abdominal infections. In cases associated with empyema it is indeed difficult to say whether lung abscess is secondary to empyema or whether it is primary and the empyema secondary. It seems clearly established, however, that a certain number of abscesses are primary, the empyema second-

ary; but it would also appear that a certain though unknown number are secondary to empyema and due to the infection of the lung tissue from the pus which perforates into the lung from the pleura. In this miscellaneous group of cases due to infections elsewhere we again have an opportunity for preventive medicine and surgery, and our preventive measures must consist in the early diagnosis and prompt treatment of the acute abdominal and other infections which antedate lung abscess.

4. *Lung Abscesses Secondary to Surgical Operations* (exclusive of those on nose and throat).—I refer, under this heading, to the lung abscesses which follow what we call aseptic operations—such operations as gastroenterostomy and gastric resection, cholecystectomy, gynecological operations, and indeed all procedures—excepting the acute infectious processes—within the abdomen; operations upon the breast and thyroid; hernia and peripheral operations. Postoperative lung abscess following these procedures is not an infrequent complication. In our own series fourteen of the sixty-two lung abscesses followed such operations; in Hedblom's[8] series nineteen of his eighty cases were of this nature. I need not go on with the citation of cases from the literature. Those of you who are interested in surgery are aware that postoperative lung abscesses—exclusive of those due to tonsillectomy and acute infectious processes—are not a rarity in any large hospital service and are complications to be justly feared. The mechanism of their production is varied. Some are undoubtedly due to aspiration of infectious material—saliva or vomitus—into the bronchi, some to septic embolism and infarction. The basic lesion is either a broncho-pneumonia or infarct—lesions which subsequently undergo abscess formation. It is within our power, I believe, to prevent some of these abscesses; and by greater care in the administration of anesthesia, by a more careful handling of tissues, by greater attention to postoperative treatment—in a word by a greater attention to detail in the performance of our commoner surgical operations.

5. I will pass over the relatively few cases of abscess due to malignant disease, stricture and other conditions of the esophagus, and of malignant disease of the bronchial tree and lung. The conditions themselves are very fatal; the diagnosis oftentimes is made late. Yet even here attempts should be made to prevent the formation of lung abscesses, especially in the benign lesions of the esophagus, such as strictures. In our own series two fatal cases resulted from misapplied attempts at dilatation.

6. I come finally to lung abscess secondary to pneumonia — broncho-pneumonia or lobar pneumonia of the ordinary type—either primary or preceded by some infectious disease, as scarlet fever, diphtheria and so on. In all earlier statistics pneumonia is given as the most frequent cause of lung abscess. In Murphy's[1] series it is given first place in the causation of this disease; in Hartwell's[10] series it is the greatest single cause; in Hedblom's[8] it stands first and in our own is the greatest single factor. Yet all these series of cases cover some years in a hospital's experience and when we consider the literature of recent years we realize that pneumonia as a primary disease is no longer the chief cause of lung abscess. Yet it is a disease which probably will remain with us and will continue to be a factor in the causation of lung abscess. What preventive measures may be taken to lower the incidence of lung abscess in this disease I must leave to our colleagues, the internists, to decide.

Viewed from the aspect of etiology therefore lung abscess is a complication, the elimination of which is largely a problem of preventive medicine and surgery. The necessary preventive measures are not clear cut and easily defined; they involve early diagnosis and treatment of various conditions, better training of surgeons, meticulous care in operative and postoperative treatment and good medical and surgical judgment. Yet if we should give more serious thought to the prevention of lung abscess, we would I think note a gradual diminution in their number.

Pathology.—There is only one point in the pathology of lung abscess to which I wish to refer. Broadly classified there are two varieties—the single and the multiple abscesses. We, as surgeons, are prone to think of lung abscesses as single abscesses for it is this variety with which we come in contact. We are apt to forget the multiple abscesses which form no small proportion of the whole and which are so commonly recognized only at the autopsy table. In our own series of sixty-two cases, fourteen passed through our hands unrecognized during life and at the autopsy table showed multiple lung abscesses. Five additional cases in which a diagnosis was made and opera-

tion performed died and at autopsy showed multiple lung abscesses, only one of which had been drained. Norris and Landis[11] saw thirty cases of *single* lung abscess but found thirty-three of *multiple* lung abscesses in their autopsy records. Hartwell[10] in the Bellevue Hospital records found 148 cases, fifty of which should have been recognized clinically; the larger proportion, however, were presumably small multiple abscesses. In Hedblom's[8] eighty cases, twenty-four were recognized only at autopsy. We see, therefore, that multiple lung abscesses vie in number with single; they defeat in the great proportion of cases our best efforts at diagnosis; they resist our medical and surgical efforts at treatment; and they contribute as largely, if not more largely, to the mortality in lung abscess. They are especially prone to occur following infectious processes such as intra-abdominal infections, pneumonia, mastoiditis and septicemia from whatever cause. Our only method of coping with them at the present time is by prevention.

Diagnosis.—We have undoubtedly made advances not only in the diagnosis of lung abscess but in the exact localization of the disease. Granting that we still rely on an accurate history, a careful physical examination, on the cough and the character of the sputum, we must admit the enormous help which the *x*-ray, and especially the stereoscopic *x*-ray, plates have contributed to diagnosis and localization. Certain experts combining an anatomical knowledge with *x*-ray studies are able with almost uncanny accuracy to localize an abscess by its relation to known branches of the bronchial tree. Others more recently have studied the problem with the bronchoscope and are not only able to localize the disease from the escape of pus into the bronchi, but claim to be able to differentiate it from other conditions. Still others have combined the use of the bronchoscope with stereoroentgenograms and by injecting bismuth paste or some other opaque substance have accurately localized the disease. We can say that we can now in the large proportion of cases not only make a diagnosis of single lung abscess but accurately localize it within the lung. But there still remain a certain number of cases in which the differential diagnosis between lung abscess and tuberculosis, bronchiectasis and localized interlobar empyema is very difficult. Within the week I operated upon a patient in whom a diagnosis of lung abscess was positively made by an expert clinician whose ability to read *x*-ray plates is amazing; and I found an interlobar empyema. Practically, from a surgical viewpoint the failure to differentiate between lung abscess and localized empyema is not serious, for both conditions require drainage. But to operate upon bronchiectasis or tuberculosis under the supposition that we are dealing with lung abscess is not only embarrassing but may be productive of harm to the patient. We still have something to do therefore in the diagnosis of single lung abscess; and very much to do in the diagnosis of multiple lung abscess.

Treatment.—In the treatment of lung abscess we have also made very definite advances and I wish to briefly outline the present status in our treatment of this disease.

1. It is recognized that lung abscess may undergo a spontaneous cure, especially when some form of postural treatment such as Garvin's method is consistently used. It is the acute abscesses with free drainage into a bronchus which are spontaneously cured.* From the available records in the literature we cannot expect more than 6 to 10 per cent of all cases to get well without other forms of treatment, although in children according to Wessler and Schwartz[7] the percentage of spontaneous cures is higher (33 per cent in thirty cases). Among other dangers to the patient in expectant treatment is the danger of allowing an acute abscess to become a chronic abscess—a condition which is far more difficult to cure by any method; and I believe it unfair to the patient to treat a lung abscess expectantly for longer than six weeks to two months.

2. *Artificial Pneumothorax.*—This method of treating lung abscesses was, so far as I can determine, first seriously employed by Jacobaeus[12] in Sweden in three cases. Since that time it has been used by a number of authors with varying results. The most favorable results have been obtained by Tewkesbury,[13] who in 1919 reported fourteen cases treated by this method, of which eleven, or 73 per cent, were cured, and three, or 27 per cent, died.

*We have recently had our first opportunity of observing the spontaneous cure of a definite well-circumscribed acute abscess. The patient presented himself with cough and expectoration and physical examination showed an area of consolidation with signs of cavitation in the upper lobe. X-ray plates showed a definite well-circumscribed abscess. Under postural treatment his symptoms improved and successive x-ray plates showed a diminution in the size of the abscess. At the present time the patient is free from symptoms and it is impossible to tell from the present x-ray plates of his chest which lung had previously been involved.

Clendening[14] in 1922 reports the same author as having had nineteen cases, of which sixteen were cured and three died. In our own experience the method was tried in five cases; two are well, three were improved but have not recently been heard from. The method, however, has not been uniformly successful and there are many unfavorable reports in the literature both here and abroad. The objections to the method are, first, its inapplicability in a rather large number of cases due to adhesions between the parietal and visceral pleuræ, and, second, its almost certain failure in the chronic rigid-walled abscesses. Yet I believe artificial pneumo-thorax has a certain field of usefulness. It is applicable in the treatment of the acute abscess in which there are no adhensions between the visceral and parietal pleuræ, with the reservation that it be not continued too long if definite improvement does not follow. As a diagnostic measure it is of the greatest help; combined with the use of the *x*-ray it tells us whether or not adhesions are present so that we may know before operation whether a one stage or two stage operation will have to be performed; in case adhesions are present it tells us exactly where they are so that we can approach the abscess intelligently.

3. *Surgical Drainage.*—This still remains from a general viewpoint the standard and best form of treatment for lung abscess. As our diagnostic methods have become more accurate, as surgeons have taken a particular interest in this field of surgery, our results in the treatment of single lung abscess have improved. The operation as you are aware is done in one or two stages depending upon the presence or absence of adhesions to the parietal pleura; and under general or local anesthesia, preferably the latter. Drainage of the lung abscess is the essential feature of the operation. The results depend upon whether the abscesses are single or multiple and whether they are acute or chronic. The single abscess is the ideal abscess for surgical treatment, and, better still, the single abscess in the acute stage. In our personal series if we eliminate the multiple abscesses and confine ourselves to the single abscesses we have twenty-four cases subjected to drainage operations in one or two stages with one death, a mortality of 4.2 per cent. Of the twenty-three patients who recovered, sixteen are entirely well one or more years, five are not well in the sense that they still have some cough and expectoration and two left the hospital greatly improved but have not since been heard from. When we study the cases which are not entirely well we find that in every instance the condition was a chronic lung abscess of from one to eight years duration. Other statistics in general bear out our experience. Lord[15] reports six deaths in sixty-two cases, a mortality of 9 per cent with 54 per cent complete or partial cures; Whittemore[6] in his second series of seventeen cases reports a 5.8 per cent mortality but the proportion of cures is not definitely stated; Hedblom[8] reports 66.6 per cent of acute abscesses cured or improved at the Mayo Clinic and 41.1 per cent of chronic abscesses cured or improved. It is this contrast between the percentage of cures in acute and chronic abscesses as brought out by Hedblom to which I wish to call your attention; for our own experience has also been that the acute abscesses are cured by operation, while the chronic abscesses surrounded by rigid, fibrous walls are difficult to cure by operation—and indeed by any method short of lobectomy. We have here, I think, a clear indication of what our attitude toward lung abscesses should be, namely to institute active surgical treatment before they have become chronic. Granting accurate localization, surgical treatment in the acute stage of abscesses will from my own experience give 75 to 80 per cent cures with a mortality of 5 to 10 per cent.

4. *Thoracoplastic Procedures.*—The failure to cure some of the chronic lung abscesses by simple drainage and the desire to treat by compression those cases which because of adhesions are not suitable for artificial pneumothorax has led to the use of thoracoplastic operations in certain cases. Various procedures may be considered under this heading and, broadly speaking, they may be divided into two groups: (a) procedures the aim of which is to collapse and obliterate the abscess cavity by compression of the lung and (b) procedures the purpose of which is to exteriorize the abscess cavity and cover its presenting surface with skin flaps or grafts. To the former belong the more or less radical rib resections of Friederich, Sauerbruch and Willms and the procedure of Tuffier (stripping the parietal pleura over the abscess and producing local compression by inserting between it and the thoracic wall a mass of fat or other tissue); to the latter, such operations as, for example, described by Emil Beck[16] (resection of as many ribs as necessary to expose the abscess; removal of the pre-

senting wall of the abscess and insertion into the abscess cavity of skin flaps). Personally I have had no experience with either group of procedures and reports which might give us an idea of their value are meager. With regard to the first group Hedblom[8] states that in cases of chronic abscess with rigid walls, collapse of the abscess may be obtained by rib resection; which I had been previously inclined to doubt in view of the known experience with rigid-walled tuberculous abscesses. Tuffier reports two cases cured by his method. The second group, such as the operation described by Beck, would appear to me the more rational providing the abscess is superficial enough to lend itself to this form of treatment, and Beck reports some very successful cases. The chronic rigid-walled *central* abscess may, because of its position, be impossible to treat by this method and be wholly uninfluenced by the compression obtained by rib resection.

5. *Bronchoscopic Irrigation.*—In recent years attempts to cure or relieve the symptoms of lung abscesses have been made by direct irrigation of or instillation into the abscess cavity through the bronchoscope. Kully[17] has reported twenty-nine cases of chronic pulmonary suppuration treated by this method with four cured, nineteen improved, three not improved and three dead. Seventy-nine per cent of the cases according to this author have been kept alive and relieved of the odor and other discomforts of the disease. Imperatori[18] after an experience with seven cases states that as a palliative measure it has a certain value but cannot be expected to cure the disease. Yankauer[19] states that in fifteen otherwise hopeless cases he has cured three, or 20 per cent. It would appear from the available records that this is a method which offers something in a palliative way in cases of chronic abscess but as a curative method has little to offer.

6. *Lobectomy.*—I refer lastly to lobectomy as a treatment for lung abscess. At the present stage in the development of thoracic surgery it should be considered only in those cases of chronic abscess which have resisted other methods of cure. The mortality is still very high—over 50 per cent—and the patients who submit themselves to this major operation should understand its dangers and its complications should they recover. A far better method at the present time of treating chronic lung abscess is to prevent its occurrence.

Let me conclude my remarks upon lung abscess with a summary of our personal experience with this disease.

1. Of sixty-two cases of lung abscess in our surgical records fourteen were unrecognized during life. Autopsies in these fourteen cases showed in every instance multiple small lung abscesses scattered through the lungs, conditions which could not have been satisfactorily treated by surgery.

2. In the remaining forty-eight cases lung abscesses were recognized. In these the abscess or abscesses followed pneumonia in twenty-seven cases; they were complications following some surgical operation in eleven cases; followed acute abdominal infections in five cases; and were complications following a miscellaneous group of conditions in five cases. The abscesses were associated with empyema in twelve cases; were not so associated in thirty-six cases.

3. The treatment of these forty-eight cases consisted of:

(a) Drainage in one or two stages in thirty-six cases.

(b) Drainage followed by lobectomy in two cases.

(c) Exploratory thoracotomy followed by collapse therapy in five cases.

(d) Postural treatment (Garvin's method) in three cases.

(e) No treatment in two cases.

Forty-three patients therefore were subjected to forty-five operations. Following operation there were thirteen deaths, an operative mortality of 28.8 per cent. Eleven deaths followed drainage operations and autopsies showed:

(a) In six cases there were multiple abscesses only one of which had been drained at operation.

(b) In one case there was a consolidation with softening and abscess formation involving the entire lung.

(c) In one case there was an acute spreading gangrene involving the entire lung.

(d) In one case there was an extensive bronchopneumonia in addition to the abscess.

(e) In two cases there was an extensive inoperable carcinoma of the esophagus with extension into and with abscess formation of the lung.

Two deaths followed lobectomy performed some months after a drainage operation. Autopsies showed that one death was due to an extensive broncho-pneumonia and the other to a pleural infection.

4. The end results in the thirty-five patients who recovered have not yet been completely studied; at the present time however they are as follows:

(a) Of the twenty-five cases which recovered following drainage operations sixteen are well from one to ten years, five are not entirely well, four have not been heard from.

(b) Of the five cases which recovered following exploratory thoracotomy plus collapse by artificial pneumothorax, two are well from one to ten years, three have not yet been heard from.

(c) Of the three cases treated by postural methods, one is not entirely well, two have not been heard from.

(d) Of the two cases who refused operation or other treatment neither has been heard from.

Such then has been our experience with lung abscess as it has occurred in a general service. There has been no attempt to eliminate any cases nor to gloss over our results. Our experience simply demonstrates that lung abscess as seen in a general service occurs as a complication of many conditions and presents itself in a variety of forms. As appears from our records it may be overshadowed by other conditions and, as in fourteen of our cases, be discovered in the autopsy room, and present itself in multiple form quite unfavorable from the standpoint of surgical treatment. It may be recognizable but occur in multiple form so as to defeat our surgical efforts, as in six of our cases. It may be a complication of a hopeless condition, as in our two cases of carcinoma of the esophagus in which the only justification for surgical treatment was the hope of relieving the patient of distressing cough, foul sputum and sepsis. Undoubtedly surgery at the present time achieves good results only in those single well-circumscribed abscesses in which the condition of which they are a complication has disappeared. If we consider only these then our results are vastly improved. In our own series we have twenty-nine such cases and of these twenty-four were treated by surgical drainage and five by exploratory thoracotomy followed by artificial pneumothorax. Only one death occurred and of those which recovered eighteen are well, five are not well and six have not been heard from. Considering the various aspects of the subject which I have tried to bring before you it seems clear that two serious efforts should be made at the present time: first, the effort to prevent lung abscess by measures which the etiology of the disease as I have outlined it would indicate, and, second, the effort to prevent the development of chronic lung abscess by instituting early active treatment of the acute abscess.

LITERATURE QUOTED

1. Murphy, John B.: Jour. Am. Med. Assn., 1898, 31, 281.
2. Fisher and Cohen: Jour. Am. Med. Assn., 1921, 77, 1313.
3. Crowe, S. J.: Personal Communication.
4. Hedblom, C. A.: Medical Record, 1919, xcvi, 441.
5. Forbes, H. H. Laryngoscope, 1918, 28, 196.
6. Whittemore, Wyman: Surg. Clinics North Am., 1921, i, 765.
7. Wessler and Schwartz: Am. Jour. Dis. Children, 1920, 19, 137.
8. Hedblom, C. A.: Med. Rec., 1919, xcvi, 441.
9. Tuffier: Quoted by Murphy (1) above.
10. Hartwell, J. A.: Ann. Surgery, 1920, lxxii, 333.
11. Norris and Landis: Diseases of the chest and the principles of physical diagnosis, 1918.
12. Jacobaeus: Quoted by Goldberg and Biesenthal, Am. Rev. Tub., 1919-20, 3, 169.
13. Tewkesbury, W. D.: N. Y. Med. Jour., 1919, cx, 849.
14. Clendening, L.: Laryngoscope, 1922, 32, 128.
15. Lord, F. T.: Med. Clin. North Am., 1919, 2, 1385.
16. Beck, Emil: Med. Record, 1919, xcv, 802.
17. Kully, B. M.: Am. Jour. Surgery, 1921, 35, 49.
18. Imperatori, C. J.: Ann. Otol., Rhin. and Laryngol., 1921, 30, 665.
19. Yankauer, S.: Med. Rec., 1920, xcvii, 1097.

DIAPHRAGMATIC HERNIA*

ARTHUR T. MANN, M.D., F.A.C.S.
Minneapolis

In the past diaphragmatic hernia has rarely been diagnosed before operation. The majority of the cases have been disclosed at autopsies. Some of them have been found in the course of an operation for other supposed conditions. During the last ten years, with the use of the *x*-ray, occasional cases here and there have been made out before operation, and they are becoming less uncommon. The *x*-ray is a great aid. With it one should be able to diagnose nearly every case. However, the attention of the diagnostician must be caught by some feature in each case which calls for roentgen examination, or it may not be used and many cases will still be missed. The clinical diagnosis is no clearer than it was before.

The comparatively large number of traumatic

*Presented before the annual meeting of the Minnesota State Medical Association, Minneapolis, October, 1922.

cases which occurred during the war, and the gradually increasing number of cases in which a definite diagnosis has been made with the aid of the *x*-ray, have led to some excellent papers during recent years. They cover the subject of diaphragmatic hernia so thoroughly and so well that it is unnecessary for me to go fully into all phases of the subject. This leaves me free to present my cases and to discuss some of the questions which may be of special interest.

Case 1. J. K., aged 30, broncho rider, Montana.

Family history: Negative.

Past history: Pertussis at 9; high-explosive wound left thigh, fleshy parts, October, 1918; high-explosive fragment removed the same day; wound healed.

Present complaint: (1) Stomach trouble. (2) General weakness.

Present illness: No stomach trouble prior to February, 1919; acute appendicitis with abscess operated on in February, 1919. Patient was in bed until June, and the wound continued to drain pus until July, 1919. During this time he was much troubled with gas in the stomach and bowels. Caught cold in March, 1919, and had a good deal of cough, spat up as much as three or four cupfuls during the day, but only one or two teaspoonfuls at a time.

At this time he had much pain in the left chest. In April he began to be better, but continued to cough and expectorate until September, 1919. Previous to the operation he weighed about 160 pounds, but after it he lost so that in July, 1919, he weighed only 124 pounds. After this he gradually gained in weight and strength. In October, 1919, he was operated on for a post-operative hernia, following the appendectomy.

Following this he felt fairly well, but was still troubled with a good deal of fullness and distress after meals until February, 1920, when the trouble became aggravated. At this time he noticed pain in the epigastrium, left lower chest and left shoulder. There has been little change in the character of this pain since that time.

The pain usually starts first in the left shoulder and in the epigastrium. Distress comes usually almost immediately after eating. Liquids often cause much more trouble than solids. He says that when the stomach is bad he has much pain in the lower left chest. When there is much trouble, or when he gets to vomiting, his heart pounds a great deal. He feels best lying on his left side with the knees moderately drawn up. There is definite relief on vomiting. He states that he has vomited food eaten thirty-six hours previously. His appetite has been very good since September, 1919; bowels, usually regular; sleeps rather poorly; has been rather nervous since he was taken sick. Weight, on admission to the hospital, on December 7, 1920, 133 pounds; present weight, 160 pounds, January 21, 1921.

Physical examination: Blood pressure, systolic, 100 to 108; diastolic, 84 to 92. Chest, apparently negative, except for tympanitic note over the left lower chest, heard more prominently at one time than an another, also some gurgling in the left lower chest. Heart, apparently negative, except that the pulse goes up very easily on exertion. General examination, negative, except that the patient is definitely undernourished. Blood, negative. Wassermann, negative. Urine, negative. Test meal, total quantity, 60 c.c.; free hydrochloric acid, 30; total acidity, 42; trace of occult blood.

Fig. 1. Shows the large portion of the stomach, above the diaphragm, filled with barium.

X-ray examination of stomach and duodenum: Shows left lower lung field above the level of the diaphragm occupied by an air bag, which immediately gives an impression of a diaphragmatic gastric hernia. Barium fills readily into the lower compartment below the diaphragm. There is an hour-glass constriction at the level of the dome of the diaphragm through which barium passes with moderate difficulty, and then flows in with a level top under a large gas bubble above the dome. The duodenal cap cannot be definitely ascertained, nor can the flow through the duodenum be seen, but the barium again first appears in the upper loop of the jejunum, below the lower half of the hour-glass of the stomach. Occasional peristaltic waves are noted in the walls of the herniated portion of the stomach. The pyloric antrum and duodenal cap appear to be in the region of the spleen, but above the diaphragm. A six-hour residue is present in the stomach, which presents two fluid levels, one in the upper and one in the lower compartment, indicating an extremely narrow hernial opening. *X*-ray examinations of colon, negative.

Diagnosis and conclusions: Diaphragmatic hernia of lower half of stomach, including the pylorus and at least a portion of the duodenum.

It is interesting to speculate on the probable etiology of this condition and its possible relation to a penetrating abscess of the lung injuring the diaphragm and this preparing the field for rupture. The most prominent symptoms of which the patient now complains had their beginning, apparently, only in February, 1920, after the chest trouble, which had lasted from March to September, 1919. However, the broncho riding, which he used to do quite constantly, may have started a separation in the diaphragm.

With the first supposition, we should expect many more

adhesions than in a traumatic hernia, which would increase, to a very large extent, the dangers and the difficulties of operation, but, with the broncho as a causal factor, there should be few or no adhesions and the dangers and the difficulties considerably lessened.

Operation, January 26, 1921: Left rectus incision, curving well up into the sternal notch. Fully half of the stomach was found rolled upwards through a transverse slit in the diaphragm. This comprised the pyloric end and part of the adjacent fundus of the stomach; which, in its slow anterior rotation upwards, had dragged the duodenum from its attachments, upwards, through the opening, into the chest cavity, so that practically the entire duodenum, as well as the lower half of the stomach, some of the fundus, and part of the omentum protruded through the hernial opening. The omentum was adherent about the opening, both inside and outside the abdominal cavity, for some distance. All other surfaces were free from adhesions.

After the omentum had been thoroughly loosened, by finger dissection, the portion of the fundus, the pyloric end and practically all of the duodenum were worked downward through the opening with moderate difficulty. The stomach slowly assumed its normal shape and size, without constrictions, though in spots its surface was somewhat roughened where it had been caught by the constriction of the opening.

The slit in the diaphragm extended from near the esophageal opening outwards and a little backwards in the posterior quadrant. This was closed with eight carefully placed chromic gut sutures. The portion of the stomach lying just anterior to this suture line was sewed to the diaphragm for the slight effect it might have against a recurrence of the hernia.

No difficulties were encountered except those incident to the placing of the sutures in the great depth of the field, which was considerable. Only a moderate pneumothorax occurred and was very easily controlled by covering the opening.

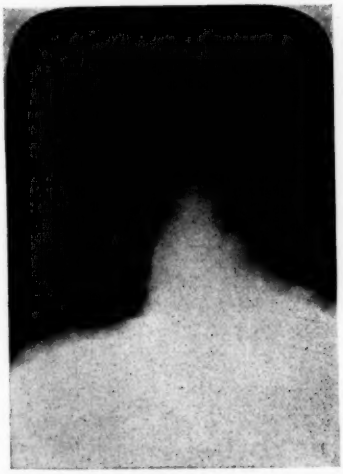


Fig. 2. Shows the healed dome of the diaphragm, after operation.

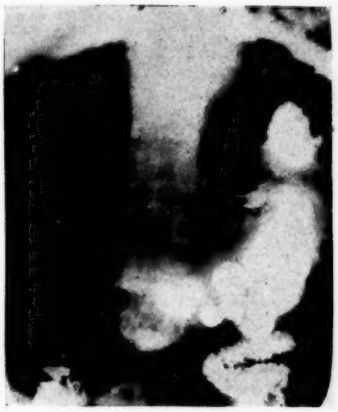


Fig. 3. Shows the recurrent hernia with the large portion of the stomach, above the diaphragm, largely filled with gas but with the barium mixture beginning to push upwards from below the hernial opening. The stomach, below the diaphragm, is largely filled with barium but shows a gas bubble beneath the diaphragm.

May 11, 1921, three months and a half after operation, he reported that he was free from all gastric disturbances, could eat any kind of food without distress, has had no vomiting and no pain in his shoulder.

Of late he has not been able to resist riding his pet broncho. As a result, all of his old symptoms have returned.

There is an area of tympany in the lower left chest. *x*-ray with barium shows a large air-bubble, above the diaphragm, beginning to fill with barium, pushing up from another air-bubble, partially filled with barium, below the diaphragm.

Diagnosis: Recurrent hernia of the diaphragm, containing a large portion of the stomach.

This man was re-operated upon December 19, 1921, eleven months after the first operation, by the abdominal route. This time the lower portion of the stomach was adherent to the vault of the diaphragm and the upper por-

Fig. 4. Taken after the second operation, shows no abdominal viscera in the chest cavity.

tion was adherent throughout its entire surface, that is, to the diaphragm below, and to the lung and pericardium in its remaining surface. This increased the difficulty of the operation considerably but it was accomplished and a satisfactory closure made of the diaphragmatic opening with two good rows of chromic gut sutures.

The convalescence was slow and was prolonged by an evident pneumonia in the base of the lung, to which the stomach had been adherent, and, later, by an attack of jaundice, which cleared up slowly. A recent examination shows the diaphragm intact.

Case 2. States that his present condition started in March, 1919. After this he was in various hospitals for five months, with a diagnosis of bronchitis and tuberculosis. After leaving the hospital he has had pain over both sides of the chest, loss of appetite, insomnia, hemoptysis, weakness, shortness of breath and loss of weight. Since this time he has been a bed patient at home or hospitalized in various hospitals, most of the time. He has had definite tuberculosis.

In all this time, while he was under study and treatment, no diagnosis of his diaphragmatic hernia was made. One month before the present study a diagnosis of the condition was made as an interlobar empyema. The physical findings are such that the diagnosis seems to rest between a pneumothorax or the presence of air-containing organs in the chest. Gurgling can be heard. The original *x*-ray plates gave an erroneous impression of the conditions within the left chest cavity so that the patient was placed under the fluoroscopic screen, and plates were taken at proper intervals. The two following *x*-ray pictures clearly show the diaphragmatic hernia.

Gastro-intestinal examination shows the barium meal to travel through the esophagus, below the level of the diaphragm, then to rise up through the diaphragm into the main portion of the stomach, which lies in the left thoracic cavity, rising to the level of the second rib anteriorly, with the patient in supine position, and sinking to the fourth rib with the patient standing. At six hours the stomach is about half filled. At twenty-four hours the barium extends from a portion of the ileum, in the thoracic cavity, downward through the diaphragm to the ileocecal valve, and in the colon back into the thoracic cavity. The splenic flexure lies entirely within the thorax, laterally and posterior to the stomach.

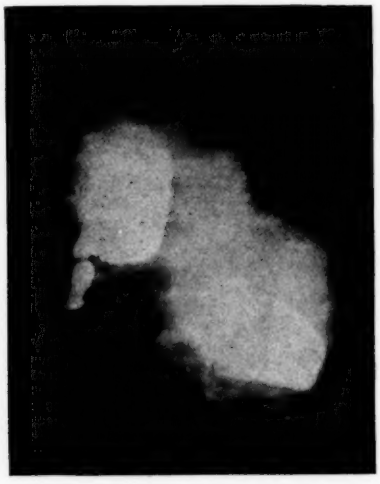


Fig. 5. (Dorsal view, left to right.) Shows a large portion of the stomach, some of the ileum and large bowel, above the diaphragm.

Fig. 6. (Dorsal view, left to right.) Shows the entire splenic flexure in the left thoracic cavity. The stomach is empty of barium and does not show.

Diagnosis: (1) Diaphragmatic hernia, with stomach, part of the ileum and the splenic flexure in the thorax. (2) Active tuberculosis.

Recommendation: Treatment of the active tuberculosis first, and then a new judgment.

As to the symptoms of diaphragmatic hernia: they will vary greatly according to the size of the hernia, the amount of constriction at the ring, and the organ, or organs, which are involved. Various abdominal viscera have been found, but the stomach and the colon are by far the most common. The symptoms vary from none at all, in some cases, through reflex indigestion, to ulcer of the stomach or duodenum, stenosis at the pylorus, cholecystitis, constipation, or obstruction of the bowels. In some cases pressure against the heart displaces it and may give rise to tachycardia, mediastinal discomfort and dizziness, pressure on the heart and lungs, and to dyspnea. Sometimes the position assumed by the patient influences the symptoms.

The physical signs vary. Sometimes there are none to be found. Tympany, sometimes succussion, may be demonstrated where normal lung resonance should be. Occasionally gurgling may be detected. Sometimes these signs will change with different positions, or at different times. If the *x*-ray study

is made, the findings will, as a rule, be quite conclusive. The arch of the diaphragm will be clear, often higher than normal, and with abdominal viscera protruding through into the thorax. The hernia will nearly always be found on the left, owing to the protection which the firm body of the liver gives to the right arch of the diaphragm.

In regard to the operation itself, there are two methods of approach. Most of the American and British surgeons show a decided preference for the abdominal route. The approach through the thorax brings one into closer reach of the diaphragm and removes the considerable difficulty encountered in placing the sutures in the great depth of the wound by the abdominal route. American surgeons are loath to produce the pneumothorax which results when the chest is opened, and, if they select this route, they have been inclined to use insufflation anesthesia. However, our war experience with chest surgery has shown that the pneumothorax is of slight importance at the time and disappears rapidly afterwards. In large hernias the collapse of the lung has already taken place, before the operation is begun.

My own feeling is that some cases will be best treated by the abdominal approach, through the right rectus incision down to or below the level of the umbilicus and extending upwards in a slight curve along the margin of the cartilages into the sternal notch, and some best by way of the chest, through a long incision between the ribs, with retractors widely spreading the ribs, which seems to me much better than the resection of long portions of two ribs.

When there are abdominal complications and abdominal adhesions the abdominal route will be chosen. When there are more or less extensive adhesions in the thorax the best approach will be by way of the chest. When both abdominal complications and extensive adhesions in the thorax are present the combined method of approach will sometimes be needed.

DISCUSSION

Dr. Warren A. Dennis, St. Paul: Dr. Mann asked me to discuss his paper for the reason that he happened to know I have had an experience of this kind.

I think perhaps I can best contribute to this discussion by briefly detailing my own experience. This case occurred about fifteen or eighteen years ago, before the time that any fluoroscopy was done. We had the *x*-ray and it was used rather indifferently. This young man, 20 years of age, came into town from North Dakota and gave the following history: A year before, he was driving on a dark night a team of horses and lumber wagon, when he suddenly met another team, and each turned aside to escape a collision, but the tongue of the other wagon struck him in the left side at the margin of the ribs. He was severely injured, was in bed a month, and then got up and seemingly was in good shape. A year later he was riding a pony and got thrown over the pony's head and was brought as soon as possible to St. Paul in a rather serious condition. The picture he presented is one that I shall never forget. He was markedly cyanotic; his pulse was 72; respiration was not hurried nor apparently labored. The abdomen was very markedly retracted, scaphoid, and there was no marked tenderness to be elicited at any place, neither did he complain of pain in any place. He had a sort of anxious expression of the face. He was not vomiting. We looked him over carefully, and I had not the remotest idea what was the matter with him. Under the upper end of the left rectus there was possibly more sensitiveness there than elsewhere. Being satisfied it was a surgical and abdominal condition, I made a left rectus incision. It did not take long, after the hand was in the abdomen, to discover there was an opening in the diaphragm, and the abdominal cavity was largely vacant. The negative pressure in the thorax was so pronounced that it was utterly impossible to retract the contents from the left pleural cavity into the abdomen, and we were actually up a stump. Some one present suggested that we make an incision in the thorax and allow air to enter, then the negative pressure would be relieved; this was done. Immediately we reduced the contents into the abdomen. The hernia consisted of the entire stomach, all the transverse colon, all the great omentum, and a part of the small bowel. The boy's condition after such a procedure naturally was not any too good. So instead of taking time to suture the diaphragm, I packed it with iodoform gauze, closed the abdominal wound, and sent the boy back to bed. He got along very well for a few days and then developed empyema. However, he recovered from the empyema and is well today.

He came to see me a couple of years ago, at which time I took an *x*-ray film of his chest, and I am sorry it did not occur to me to bring that over here to show you. The film shows that his cure had resulted from adhesions of that portion of the diaphragm through which the opening occurred to the chest wall. This opening may occur in any place, but where it is due to trauma it is likely to be in the neighborhood of the trauma.

Let me say that congenital diaphragmatic hernia is not uncommon. I have seen several autopsies made on individuals who died as a result of it, and these are likely to have other abnormalities as well. Our attention was not called to diaphragmatic hernia to any great extent until recent years, but it is becoming more and more commonly recognized. When, as a student, I read of diaphragmatic hernia I thought it was something nobody expected to see, but since the *x*-ray has been used intelligently, if one has a notion that such a condition may be encountered in the course of a routine examination, it is almost certain to be discovered.

This demonstration which Dr. Mann has given us is an excellent one. In fact, I have never seen anything which

demonstrates the pathology so well, and he has given us a clear idea of the conditions which may exist in diaphragmatic hernia.

Dr. Arnold Schwyzer, St. Paul: It struck me, when I heard these cases reported, that there might be an important difference between the two conditions. You heard Dr. Mann say that it was comparatively easy to replace the organs into the abdominal cavity. For that reason the abdominal procedure was the best or the proper one. If you go at it first from the abdominal side, you may succeed in getting everything into place from the abdomen alone, and you may succeed in closing the gap in the diaphragm from the abdominal side without opening the chest above.

The case just cited by Dr. Dennis impressed me as a much more serious acute clinical picture. He could not approach the contents from below; they were firmly fixed in the thorax and he had to go into the chest to get the parts free.

He mentioned that an empyema developed, but he did not say or did not have time to say whether there had been strangulation or not. That is an miportant point; for as soon as we have strangulation the clinical picture is very much more serious. Then we have to go into the chest, we have to mop out every vestige of hernial fluid, and then after opening the abdomen, we have a chance to work from the two sides. The chances to sew from above make suturing easy and safe.

Introducing sutures from below, when the chest wall is opened, is made easier by pushing down with the hand the diaphragm from the pleural side. Thus the suturing can be done from the abdominal side, otherwise it is easier to sew from above. One may like to sew in such a case on the upper and also the under side.

In a case like Dr. Mann shows, the suture alone is not always an absolutely safe thing and the transplantation of fascia has been suggested. Nevertheless it is a mighty fine thing to have made a diagnosis in such a case and have the patient make such a good recovery.

The important thing in this paper for our benefit is that we have had brought before us a condition which is not as rare as we have heretofore supposed, and the simple fact that we have these pictures in our heads will keep us from making big blunders, especially dangerous blunders, when we have cases like Dr. Dennis seems to have had, in which there was strangulation and need of prompt and correct action.

There were observed cases where the stomach outlet had been blocked, or even where the colon was necrotic. So it is important, in the acute cases, that we think of these conditions. To use the *x*-ray is the classical way of proving what we have. If we do not have the *x*-ray at our command, we can get information by ballooning the colon. We can balloon and fill the colon from below and may find that it only balloons up to the splenic flexure. But the *x*-ray is, of course, the best way of demonstrating the condition.

Dr. Warren A. Dennis, St. Paul: I would like to say that my difficulty in reducing the contents was not due to the ether, but it was by suction in the pump. With respiration I could bring down the contents when I did not make enough tension on the tissue.

Dr. Jennings C. Litzenberg, Minneapolis: I wonder if this suction Dr. Dennis mentioned is not a real thing that has something to do with the etiology.

I had one case of diaphragmatic hernia in the newborn in which nearly all the abdominal contents were above the diaphragm. The baby lived twenty-eight days, and it was impossible, it seems to me, that so much of that small intestine could have been above the diaphragm at birth. This child was seen by a pediatrist, and a diagnosis was not made. I wonder if the breathing of the child mentioned by the essayist, and suction of the contents of the abdomen into the chest after birth, might have accounted for the presence of so much of the intestines above the diaphragm. We have observed only this one case in the newborn. We were greatly surprised as to the amount of intestines that were in the hernia.

Dr. Arthur T. Mann, Minneapolis (closing): Some interesting points have been brought out in the discussion, and they are more or less true. It strikes me regarding the negative pressure that if it were not the adhesions which caused the difficulty in pulling it down, it might possibly be obviated in two ways. The site of the hernia is always high. If this is the diaphragm (indicating), when we have a hernia down here, and it is too tight, we make the opening larger. That might have been done there possibly, and then we would have a little longer place to sew. If large enough to get the finger around well, and still the negative pressure caused trouble, possibly a catheter might have been put there and the air allowed to go in through the catheter while the contents were being withdrawn.

In the case of the newborn, of course there was a natural difficulty, and I do not know the embryology of the subject thoroughly, but it strikes me, at first the lungs are closed; they are tight, and there is probably little or no negative pressure, so that during the formation time of the diaphragm the negative pressure possibly may not be so much of a cause. The negative pressure in the chest cavity is definitely measured and is only about 10 mm. of mercury. In some of these cases the incision between the ribs and the wide stretching of the ribs will give easy and abundant access to the upper portion. Some of these cases will be best operated in that way, by the chest approach, and in some by the abdominal route. In some cases, where there is also trouble below the diaphragm, we have to make the opening both ways.

Some one asked me whether the pneumothorax in my cases was taken care of; it was not at the time of the operation. The air was not pumped out. The lung is already compressed by the contents of the hernia and often there will be no further compression when air replaces the herniated mass on its replacement within the abdominal cavity. We produce artificial pneumothorax, as some medical men do in cases of tuberculosis, and for some other reasons. This air is found to be absorbed gradually, about fifty c.c. each twenty-four hours, so that after a time a new injection must be made to maintain an artificial pneumothorax. That shows what nature will do with the air. In our cases it had absorbed all the air in a reasonable time.

THE TUBERCULOSIS CRUSADE IN MINNESOTA*

H. Longstreet Taylor, M.D.
St. Paul

"Think the inconceivable thought. Go the impossible way. Do the impossible deed."

About thirty years ago a self-appointed "committee of one" resolved that Minnesota should have a state sanatorium. This resolution was adopted five years before the Massachusetts State Sanatorium at Rutland was erected. The Rutland institution was the first state sanatorium in the United States.

The campaign was opened by an article[1] on this subject which appeared in The Northwestern Lancet, December 15, 1893.

It is of interest to note that the relationship of the number of beds for consumptives to the decline in the death rate is clearly stated in this paper, a relationship upon which some fifteen years later Dr. Arthur Newsholm[2] based his law on this subject. The value of these institutions as schools for the tuberculous is outlined therein. The prophecy that every state and large municipality would have to conduct sanatoria for the treatment of consumptives, is being rapidly fulfilled.

After this bomb proved to be a dud, the committee appropriated Rienzi's oath to the Romans when he said, "Again I swear, the Eternal City shall be free!" and once again resolved that Minnesota should be forced into anti-tuberculosis work.

Then followed years of educational efforts. Illustrated lectures were given anywhere in the state wherever and whenever an audience could be gathered together. These lectures proved to be very popular. The people were eager to learn about tuberculosis and anything that could be done to control its spread. In one place the hall had been condemned as unsafe, as the lecturer discovered when the policeman, who had been stationed at the door to admit only a certain number, reported that he had turned away more than five hundred people.

Many articles appeared in the press, and even at this late date the committee desires to express its lasting appreciation of the invaluable aid and assistance rendered by the newspapers both in the cities and country to the anti-tuberculosis cause. Line upon line and precept upon precept, the truths about tuberculosis were spread broadcast among the people of the state in the hope of having the support of an enlightened public opinion, to sway the votes when the matter should finally come before the State Legislature for action.

State, county and district medical societies were asked to pass resolutions, which they generally did, sometimes however, only after considerable hesitation.

The Minnesota State Medical Association adopted a resolution endorsing the proposition that the State should care for the consumptive poor at its Duluth session in 1903[3].

The committee now felt that the time was ripe for laying the whole matter before the Legislature, which was to convene in January, 1901. A bill for a law to establish a state sanatorium was taken charge of by Senators F. B. Daugherty of Duluth, Judge Grindeland of Warren and L. E. Jepson of Minneapolis. In the House, Dr. Werner Hemsted, Dr. L. W. Babcock, Dr. John H. Dorsey and Rukhard Hurd were enthusiastic supporters of the bill. Senator Daugherty, however, steered the bill most skillfully throughout the session and brought it safely into port in the end. He was the father of Dr. E. B. Daugherty, the prominent tuberculosis specialist, and of Dr. L. E. Daugherty, the successful surgeon, both of whom now reside in St. Paul.

Many prominent physicians and citizens interested in the subject spoke at the committee hearings on the bill. At this critical time Dr. George S. Wattam, of Warren, became a most valuable member of the committee. His wide acquaintance among the legislators was of immense service and to him much of the credit belongs for the successful issue of the initial attempt to secure legislation. Toward the close of the session, Senator Daugherty switched from the bill providing for founding a sanatorium to one creating a commission to investigate the subject and report to the next Legislature.

*Read by special request to the staff of the Lymanhurst School for Tuberculous Children, February 13, 1923.

Governor Van Sant, who had taken a decided stand in favor of the bill, appointed Dr. James L. Camp of Brainerd, Dr. George S. Wattam of Warren and Dr. H. Longstreet Taylor of St. Paul, President, as the Commission. This Commission was authorized to investigate the subject thoroughly and if it deemed it advisable for the state to erect a sanatorium, it was also to select a site.

The Commission in a body or individually, visited nearly every sanatorium from Canada to North Carolina and from Maine to California.

It decided, mirabile dictu, to report favorably upon the proposition that had been submitted to it.

The next work was to select a site. Every member knew that it should be located near the center of population and of railroad accessibility. They also knew that the appropriation would depend upon the selection of a site far north of the ideal one. The Commission inspected a number of locations but adjourned without any decision after many adventures, among which hospitality was not the most pronounced, for many communities were stricken with acute phthisiophobia upon the appearance of the Commission in their midst, and their greatest desire was to speed it upon its way to the next place. Eventually the Chairman, disguised as a summer visitor, selected the site upon which the State Sanatorium was erected[4].

The report of the Commission[5] was presented to Governor S. R. Van Sant and transmitted by him with a strong endorsement in his message to the Legislature.

Senator A. F. Ferris of Brainerd and Mr. A. L. Cole of Walker piloted the bill through both houses and secured an appropriation of $25,000. The bill also created the Advisory Commission for the State Sanatorium. Governor Van Sant reappointed the members of the original Commission and added Dr. G. B. Weiser of New Ulm and Dr. A. P. Williamson of Minneapolis. Dr. Williamson resigned in a short time, and Dr. G. F. Roberts of Minneapolis was appointed to fill the vacancy, which position he held until his death, when Dr. P. M. Hall succeeded him. Dr. Hall was well acquainted with the public health side of the tuberculosis problem from his long experience as head of the Minneapolis Municipal Department of Health. Minnesota is to be congratulated that he has dedicated himself entirely to tuberculosis work and that the state has the benefit of his learning and skill both as President of the Advisory Commission and as Superintendent of the State Sanatorium. Dr. P. A. Smith of Faribault was appointed in Dr. Weiser's place in 1909. He has served most efficiently as secretary of the Commission since Dr. Wattam's resignation in 1912.

Quite a dramatic event featured the passage of this bill on the last day of the session. The appropriations bill as read, contained no item in regard to the sanatorium. Mr. Cole was very reluctantly persuaded to enter a protest at this omission. It has never been customary to amend the report of the Appropriations Committee, but as soon as he called the attention of the House to the point, so many representatives jumped to their feet and raised such a storm that the speaker sent a committee to see what could be done about it. The committee quickly returned with the news that the chairman of the Appropriations Committee, Senator Ambrose Tighe, said that the State Treasury could spare $25,000. This sum was immediately incorporated in the bill.

The medical profession as a body, seemed to be greatly prejudiced against the bill and deluged the Legislature with letters protesting against the state going into the practice of medicine. It had been impossible to get the Legislative Committee of the State Medical Association to endorse the bill and much of this opposition was stirred up by that committee. But as one of the members of the Senate said, "There must be something good in this bill, since the physicians are so opposed to it, and I think we had better pass it." From which we may deduce that some knocks are boosts.

Mr. Clarence Johnston, architect, at the request of the Advisory Commission, and in consultation with it, drafted plans for an ideal state sanatorium which unfortunately have been blocked by small appropriations. The result as seen today, in no way resembles the original plans. The conglomerate, however, has resulted in buildings that are well adapted to the purpose for which they were intended. Nevertheless, this patchwork method of assembling an institution, little by little, never has been and never can be satisfactory, although impossible to avoid when building funds come in uncertain amounts at indefinite times, according to the whims of the varying committees on appropriations in successive legislatures.

The Advisory Commission secured the services of Dr. Walter J. Marcley as the superintendent of the state sanatorium.

Dr. Marcley had been superintendent of the Massachusetts State Sanatorium at Rutland since it was opened in 1898, and so was thoroughly well equipped for the post.

The State Sanatorium opened its doors to sixty patients fifteen years ago and now can accommodate two hundred and sixty-five. This is a rate of growth little expected by the Legislature, which thought $25,000 a very liberal appropriation in 1903. Its present value is $523,000.

The opening of the State Sanatorium was just fourteen years after the self-appointed committee went to work.

The State Sanatorium was not the first sanatorium to be established in Minnesota. An attempt was made to take care of a few cases in tents during the summer months at the Ramsey County Poor Farm. This was done by the president of the Advisory Commission. In order to keep the colony away, the field was plowed and planted to potatoes early the next year. Shortly after this rebuff, the St. Paul Anti-Tuberculosis Association was induced to open a summer camp on Cherokee Heights, West St. Paul. The president of the Advisory Commission was in full medical charge of this institution. It did not survive more than two or three summers, at which time the neighbors had a mass meeting and it was decided not to precipitate a riot by attempting to open it again.

The first sanatorium in Minnesota was the tuberculosis department opened in the Luther Hospital, at Tenth and John Streets, St. Paul, in 1903, of which department the president of the Advisory Commission was in charge. The patients were removed to the Pokegama Sanatorium, in Pine County, when it opened its doors in May, 1905. The Luther Hospital abolished its tuberculosis department because the nurses were afraid of the patients and refused to nurse them.

In 1908 Minneapolis opened Hopewell, a branch of the City Hospital as its tuberculosis department. The summer camp for children was established by the Visiting Nurses Association and Thomas Hospital was erected by Mrs. George Christian the same year.

In January, 1910, Cuenca Sanatorium was opened under the medical charge of the president of the Advisory Commission and that summer the foundation of the present Ramsey County Preventorium was laid, when a camp for children, predisposed to tuberculosis, was established on the shore of White Bear Lake. Both of these institutions were built and conducted by the St. Paul Anti-Tuberculosis Association. The Preventorium has always been under the medical control of the then president of the Advisory Commission.

Dr. E. L. Tuohy of Duluth succeeded in having a bill passed by the Legislature of 1909, authorizing boards of county commissioners to appoint county sanatorium boards and to appropriate money for the erection of county sanatoria.

This was the first step toward providing St. Louis county with a sanatorium, and Dr. Tuohy appreciated the importance of such an institution in carrying out the ambitious program which he had outlined for Duluth and St. Louis county[6]. With Dr. William M. Hart and his successor, Dr. A. T. Laird, as his chief lieutenants, it is not to be wondered at, that Nopeming Sanatorium has achieved such an enviable reputation, and that from it as a centre, the county tuberculosis work of St. Louis county is far ahead in its thoroughness, that its dispensary work is widely distributed throughout its territory and its follow-up work all but perfect.

For several years the State Board of Health kept a tuberculosis exhibit traveling over the state doing excellent educational work. Mr. Christopher Easton at this time executive secretary of the Minnesota Association for the Prevention and Relief of Tuberculosis, assisted the State Board of Health in collecting the material for the tuberculosis exhibit, and in the educational work done in connection with it. The nucleus of this exhibit was shown at the International Tuberculosis Conference held at Washington, D. C., in 1908.

Mr. A. R. Blakey[7], who has since taken his M.D. degree, was manager of the exhibit and traveled with it as long as it was in active service. He too was very active in the educational part of the work. It was visited by thousands in Minnesota and by request journeyed into South Dakota on one occasion.

In 1912, the State Board of Health appointed a committee to draw up a bill for a law under which the counties could be induced to erect county institutions. This committee consisted of Dr. E. L. Tuohy, chairman; Dr. W. J. Marcley, secretary;

Mr. Gerrould, University of Minnesota; Dr. H. M. Bracken, executive secretary of the State Board of Health, and Dr. H. L. Taylor, president of the Advisory Commission.

A great many meetings were held and the proposed bill was most carefully drawn. The bill passed the 1913 session of the Legislature and has been the foundation of the county sanatorium legislation and work in Minnesota. It placed the duty of supervision, control of the institutions and distribution of state aid in the Advisory Commission. The office of executive secretary, created by the law, has been filled by Dr. Robinson Bosworth since the early summer of 1913. The very successful results which have kept Minnesota in the van of the states leading in tuberculosis work have largely been due to him. In an editorial in The Modern Hospital, March, 1917, Dr. J. A. Hornsby says, "We are publishing elsewhere in this issue two articles on Minnesota's county tuberculosis sanatoriums, and the remarkable record which that progressive state is making in the fight against tuberculosis. Right here we should like to remind our readers of a few of the things which have been achieved out on the prairies of the Northwest.

"Minnesota has provided institutional care for a larger proportion of her tuberculous population than any other state in the Union. She has not merely provided this care; she has brought it to the doors of her citizens. Realizing that sanatoriums can accomplish nothing unless patients can be induced to enter them, and that separation from the patients' families is generally the greatest deterrent, Minnesota has devised and put into operation a system of county hospitals. Over 60 per cent of the population of the state thus has sanatorium facilities within easy reach, and we have no doubt that provision will be made in the near future for the remaining 40 per cent.

"In construction, equipment and management, these county tuberculosis hospitals have been kept on a uniformly high plane. All buildings must conform to the standards set by the state advisory commission, and explained in Dr. Bosworth's article. Each sanatorium is equipped with all the most modern appliances, whether for treatment or for sanitation. The administration has not been allowed to fall a prey to politics.

"Above all, Minnesota has had the wisdom to confide the oversight of her county sanatoriums to alert, progressive and most enthusiastic specialists in the treatment of tuberculosis. Every county sanatorium in the state is inspected at frequent intervals by some representative of the state advisory commission in order to avoid deterioration of the service to the level of a county poor farm. Probably there are no state institutions in the country which are so frequently or so thoroughly inspected."

Another evidence of the results of Anti-Tuberculosis work in Minnesota is to be found in the following figures. The death rate in 1921 from tuberculosis was lower than it has ever been in the history of the state. In 1911, 119 people out of every 100,000 in the state died of this disease. In 1921, 77 people of every 100,000 died of tuberculosis. As compared with 1911, ten years ago, Minnesota is saving 972 lives a year.

The Legislature of 1913 also placed a building fund of five hundred thousand dollars ($500,000) at the disposal of the Commission. To the Hon. Frank Clague, then chairman of the Senate Appropriations Committee, credit is due for this generous sum. This fund could only be used to aid the counties and each county could only receive a sum equal to its own appropriation, thus insuring the expenditure of at least $1,000,000 in buildings. As state aid to individual counties is limited to $50,000, the appropriation of $500,000 has actually been responsible for the expenditure of nearly three times that sum, as many counties have spent considerably more than $100,000 on their institutions.

From this building fund state aid was paid to each of the fourteen county and district sanatoria in Minnesota. Nopeming and Ottertail county institutions were founded under Dr. Tuohy's county law before the law of 1913 was passed, but under the provisions of that Act, they received their full quota of state aid.

The history of the Ottertail County Sanatorium is both interesting and instructive. As noted above, it was established under the County Sanatorium law of 1909. Under that law the County Sanatorium Commission was supreme. There was no state control as there was no state aid provided by that law.

The Ottertail County Sanatorium was located in an impossible place as far as sewage disposal, fuel supply and accessibility to the territory whose consumptive population it was intended to serve, was

concerned. Such mistakes could not be made under the supervision of an expert board with its standardized requirements in regard to the location, soil, local altitude, wind protection, water supply, sewage disposal, distance from its railroad base, architectural plans and specifications and so on.

The whole thing is a very disagreeable mess, but it shows what County Boards with no experience are liable to do. But the important lesson contained in this chapter of woes, that is the history of this institution, is the absolute necessity of having a State Board, with broad powers and ability to enforce their advice, such as the Minnesota Advisory Commission has.

It would, indeed, be a good thing if every state engaged in tuberculosis work would put their state aid funds into the hands of a Tuberculosis Commission enpowered to pay them only to institutions that are doing good work. Minnesota has her state funds better protected than those of any other state and in a measure buys good service from her institutions. Fifty thousand dollars to help out the building and five dollars per patient per week for maintenance, amounts to quite a tidy sum by the end of the year.

The history of the first twenty years of tuberculosis work in Minnesota would be incomplete without a record of the valuable part played by the Minnesota Association for the Prevention and Relief of Tuberculosis.

In 1893 when the voice of one crying in the wilderness was heard in the land, a very feeble attempt was made to organize a Tuberculosis League in Minnesota. The Pennsylvania Tuberculosis Society had been founded in the eighties and was doing good work. In Minnesota, however, even the first convert could not be made and so the matter slumbered for ten years or more when it was revived by the late lamented Dr. F. F. Wesbrook, Dean of the Medical Department of the University of Minnesota, and others and Minnesota's Anti-Tuberculosis Association resulted.

In 1907, Mr. Christopher Easton[8] became the first executive secretary of the organization which finally struggled through the ills and poverty of its earlier years and was rechristened in 1915 as The Minnesota Public Health Association. It is now, as it has been for years, a very important educational factor in the Minnesota health field.

At the present time under the leadership of Dr. C. L. Scofield, it has risen to heights of usefulness unattained under any former administration. All misunderstandings and hostilities between public health agencies in the state have become a thing of the past, and consequently public health work is going on much more smoothly and efficiently than was formerly possible. To tell the whole truth one must admit that Dr. Scofield has succeeded in making the lion and the lamb lie down together. This harmony has been the goal toward which Dr. Scofield has been working for many years and he has succeeded in putting an end to conditions which have not only been intolerable, but which were also the greatest hindrance to any progress.

This sketch of the beginnings of tuberculosis work in Minnesota has covered the first twenty years. You are familiar with the more recent achievements and know the structure that has been reared on the foundations described this evening.

And yet there still remains much to be done. Notification of all cases, one of the important requisites to efficient public health work in tuberculosis, is still so inefficient that in 25 per cent of cases the death certificate is the first notice the health department receives. This is partly due to the absence in most communities of any follow-up work. Many physicians excuse themselves for not reporting their tuberculosis cases because the health authorities do nothing, in most localities, after the cases have been reported. This excuse will be done away with when the authorities institute some social and educational service that will be a real help to both physician and patient. Social service must be provided to guide not only the cases recently diagnosed, but also those who have left the institutions. The sanatorium graduate as a rule, is an unfinshed piece of work and the superintendent of every institution would welcome an efficient follow-up of his patients, to help them solve their problems and shield them from relapses.

The Advisory Commission has authorized the installation of such a system in one sanatorium district and if results justify such a request, funds will be asked for to spread it all over the state.

Another chapter which has as yet been barely touched upon is the immensely important one of sheltered employment for ex-sanatorium patients. Permanent results from sanatorium treatment depend upon its solution.

Let this recital close with an attempt to portray an ideal arrangement that is not nearly as vision-

ary as a state sanatorium of two hundred and fifty beds seemed to be in 1893.

Picture a village surrounded by green fields and wooded knolls. The well paved streets from all directions converge to a civic center. Here is an administration building, a theatre, a community church, stores and shops, grouped around an attractive square. Near this center several sanitary factory buildings are seen and at the outskirts a large modern sanatorium. Detached cottages, with their flower and vegetable gardens, house the inhabitants of this Utopia whose ruler is the medical superintendent. His police force consists of a corps of visiting nurses; his permit accurately defines the working hours of each factory hand; his overseers in the factory are trained men and women. If the report of his agents, in home or factory, show tendency toward a relapse in any member of the community, he is immediately returned to the sanatorium, which stands between these citizens and the outside world, and from which every one of them has been paroled. In other words they have all passed through the sanatorium to obtain citizenship in this favored village, but their families may join them in their respective cottages and from these healthy residents, workers will be enrolled to do the heavy work.

This is but a sketch and leaves many nooks and corners to be filled in, but any one who has visited Papworth Colony, Cambridgeshire, England, knows that it is founded on an accomplished fact.

"Take up our quarrel with the foe:
To you from failing hands we throw
The torch; be yours to hold it high."

REFERENCES

1. Taylor, H. Longstreet: The necessity of special institutions for the consumptive poor. Northwestern Lancet. Dec. 15, 1893.
2. Newsholm, Arthur: Transactions of the Sixth International Congress on Tubercoulosis. Vol. vi, p. 80.
3. Northwestern Lancet. Vol. xx, p. 294.
4. St. Paul Medical Journal. Vol, vi, p. 193.
5. Report of the Minnesota State Tuberculosis Commission. St. Paul Medical Journal. Vol. v, p. 141.
6. Tuohy, E. L.: The necessity of institutional care for the tuberculous. The tuberculosis problem. St. Paul Medical Journal. Vol. xii, 1910.
7. Blakey, A. R.: The traveling tuberculosis exhibit. St. Paul Medical Journal. Vol. xii, 1910.
8. Easton, Christopher: Statistical aspects of tuberculosis. St. Paul Medical Journal. Vol. x, 1908. Standardizing anti-tuberculosis work. St. Paul Medical Journal. Vol. xii, 1910.

MINNESOTA'S ANTI-TUBERCULOSIS CAMPAIGN*

ROBINSON BOSWORTH, M.D.
St. Paul

Those of us devoting time and energy to the fight against tuberculosis in this state are warranted, we believe, in having a certain degree of satisfaction or gratification in the results of this effort. True, these results are incomplete, but they serve as an index to what can be accomplished in the future should we not permit ourselves to be misled into the belief that the fight has been won.

During the past ten years tuberculosis deaths have been reduced 35 per cent as shown by State Board of Health statistics. Should we base our estimate on the average yearly deaths prior to the establishment of Sanatoria and compare last year's fatalities with that average, we obtain a 29 per cent reduction. Still there were in Minnesota 1,872 deaths from tuberculosis, all forms, during 1921, showing the need for continued and greater activity for the future.

It is difficult to place before others the one great cause of this decline. It is of some significance, however, that this reduction has been accomplished during a period when Minnesota enjoyed for the first time sanatorium privileges in any degree comparable to its requirements. Credit is due in a large measure to the education of the public concerning tuberculosis and, in fact, concerning public health in general, for we appreciate that factors which tend to prevent disease, whatever that disease may be, and which elevate the general plane of living, reflect directly or indirectly as lessened tuberculosis. To enumerate and evaluate all factors is difficult—to visualize results is easy; a 35 per cent decrease in the 1921 rate over that of ten years ago means 972 less deaths than had the former rate persisted.

The part played by sanatoria is more readily appreciated where it is understood that on January 1, 1922, 10,616 patients had passed through our sanatoria, state and county. Of these 9,707 were pulmonary cases, 829 non-pulmonary; 7,768

*Read by invitation before the Consulting Medical Staff of the Lymanhurst School for Tuberculous Children, Minneapolis, November 14, 1922.

pulmonary cases can be made a basis for a medical report as to results of treatment having remained thirty days or longer for observation. There were 1,939 patients who remained in institutions less than thirty days; 525 of these because of deaths occurring during this short period after admission. Our county sanatoria by law gives preference to the far advanced cases, as is shown by the percentage admitted, 47.2 per cent of the total as compared to 35.6 per cent admitted to the state sanatorium intended by law for the incipient. While more far advanced cases do enter county sanatoria than the state sanatorium, no greater percentage of incipient cases actually reach the state sanatorium, as is shown by 17.2 per cent for county sanatoria and 17.3 per cent for the state institution. The state sanatorium does admit a larger percentage of moderately advanced cases, 47.1 per cent, compared to 35.6 per cent for the county. In order for the state sanatorium to admit favorable cases in large numbers they must include the moderately advanced patient. Thus, there were discharged from county and state sanatoria combined, 1,336 incipient pulmonary cases, remained thirty days or longer, of which number 35 died (2.61 per cent). There were 3,155 moderately advanced cases, of which number, 322 died (10 per cent); of 3,277 far advanced cases, 1,315 died (40 per cent). A fairly good indication of the value of early diagnosis and early treatment. The average duration of treatment was twenty-nine weeks at the state sanatorium and thirty weeks at the county sanatoria. It is interesting to note the groups remaining the longest period; eight cases with Turban 1 lung lesions suffering from complications which threw them into the far advanced group and with negative sputum stayed forty-six weeks on the average; none died, three were improved on discharge, four were quiescent and one arrested.

We have been curious as to whether the far advanced cases increased or decreased the average length of treatment for the total. Including all cases whether they remained less or more than thirty days we get 165 days as the average for the incipient cases, 179 for the moderately advanced and 168 for the far advanced, or an average for the entire group of 172 days. On the other hand, should we eliminate from consideration those cases not remaining thirty days or longer, in other words, those who died shortly after admission and others who could not possibly be benefited by so short a treatment, we get 196 days for moderately advanced cases and 189 days for the far advanced.

In introducing another subject I wish again to refer to statistics. There were 3,753 cases who had positive sputum on their return to their homes. There were 4,561 who had positive sputum before they entered sanatoria. Although sanatoria are built or subsidized by the state, because of their public health protection character it would appear that sufficient opportunity exists for the infection of healthy individuals before these patients reach our institutions and again after their return home. It is to be regretted that so large a number must lose their greatest opportunity for recovery, which is prior to the appearance of tubercle bacilli in the sputum. That there is a tremendous difference in the prognosis of negative and positive sputum cases is easily shown of 152 incipient cases discharged from sanatoria during 1921. Of these, 129 had negative sputum and 23 positive sputum. Among the 129 negative sputum cases only one died, seven failed of improvement, forty-three improved, twenty-nine reached a quiescent stage, thirty-eight were apparently arrested, ten arrested and one apparently cured. Of twenty-three positive sputum cases, four died or nearly one-sixth, six failed of improvement, about one-fourth, seven improved, and six reached a quiescent stage. None were arrested or apparently cured.

The same condition holds true for the moderately advanced and far advanced cases. Of 130 negative sputum cases, thirteen moderately advanced cases were arrested, twenty-nine apparently arrested and only five died; while among 122 positive cases, twenty-nine died and none reached the apparently arrested or arrested classification.

Among fifty far advanced negative sputum cases eight died but six were apparently arrested.

Of 315 positive sputum cases, 174 died and none were classified better than quiescent upon discharge and only fourteen of these.

The question naturally arises where can be shown the value of sanatorium treatment for the positive sputum cases? There are two replies. *First*, permit me to call your attention to the fact that the length of residence alone, twenty-nine weeks, for the positive sputum cases is not sufficiently long to permit of the cases becoming negative to bacilli, which fact in itself makes it impossible to classify the case better than quiescent. Many of these cases

will lose their bacilli in time after leaving our institutions and then become eligible for a better classification. *Second,* the greatest service rendered by institutional treatment of positive sputum cases is the protection afforded the healthy members of the community, especially the children. It is of the greatest importance to protect children from oft repeated massive infection by tubercle bacilli.

The great reduction in the amount of tuberculosis in Minnesota has been largely attained by removing for eight months on the average some 4,000 positive sputum cases of tuberculosis from their intimate associates. This contention is supported by Newsholme of England, who maintains that the diminution of tuberculosis can be anticipated by computing the percentage of total deaths from tuberculosis occurring annually in institutions following an average hospital residence of one-third of a year, which is approximately one-ninth of the infection period of the fatal cases of tuberculosis. Basing his contentions on the supposition that should all deaths occur in institutions after a residence of the total infection period (3 years) no amount of infection would occur: therefore, no new cases. Newsholme's Law is again supported by the admitted fact that tuberculosis has been on the decrease in those countries where hospitalization of the tuberculous has been possible whether as part of an intelligent anti-tuberculosis campaign or not. Even before Koch's discovery of the tubercle bacillus, tuberculosis was on the decrease but only in those countries where hospital facilities were present and where unintentionally perhaps isolation was nevertheless in a degree efficacious.

If then it can be shown that our efforts are successful in the degree in which positive sputum cases are supervised, what can we take to ourselves in the way of gratification or satisfaction when we consider the 4,000 positive sputum cases returned to their homes under the present system of follow-up? This is where the weakest link in our chain exists, in my opinion.

Not only are these returned cases to be in a large degree sources of infection to others but for many of them supervision is demanded, should they preserve that degree of improvement acquired from sanatorium treatment. The period following sanatorium residence is an extremely dangerous one for the average consumptive. Many factors work to make this true. Certain gains have been made; to many his general appearance is such as to stimulate suspicion as to the correctness of his diagnosis; he is impatient to break his bonds and return to active production life again; his funds are low and the question of support is pressing. And yet the community offers little of efficient relief or assistance in solving his problems.

Minnesota needs a state-wide follow-up system offering to the consumptive who may be convalescent something of real benefit to his physical, mental and economic condition. This man has every right to vocational training. In many instances, his old trade is not a proper one for an arrested consumptive to pursue. Many cases will never attain that degree of health permitting of full eight hours labor under ordinary conditions of work in competition with normal laborers. Still there is in him producing ability limited perhaps to one-half day or quarter day which is valuable to stimulate and develop rather than to waste entirely by reactivity or to dissipate by over-work, followed by relapse and what must ultimately occur, death. The larger part of the work of supervising convalescent consumptives is in the main limited fairly well. Most of the relapses occur during the first four years after sanatorium treatment is terminated. During the next three years relapses are less frequent due to the survival of the fittest and from the seventh year on the death rate is that of the general population.

Something of childhood infection and childhood tuberculosis might be in keeping at this time. Many interesting facts have come to light in studies of childhood tuberculosis. That much more work is required is evident when we note some of the phenomena which have been brought to light and attempt to correlate them.

Very little organized effort has been made against tuberculosis in infancy and early childhood. According to Hess, when we divide the total number of deaths occurring from tuberculosis into age periods, we find that in the first year of life there are as many fatal cases of tuberculosis as in any other one year age period, and the second year of life is only to a very small degree less fatal. It is interesting to note that beginning with the age period from the second to the third year the total number of deaths from tuberculosis is represented by a figure approximately one-half the total deaths

occurring during the first or second age period. This condition exists practically until the thirteenth year, where a sharp increase takes place. If we classify the sexes in which this mortality occurs we find that this sharp increase in this age period is entirely due to female susceptibility, there being no definite increase in the death rate among males until the age of sixteen arrives. This has been explained as a matter of maturity, the girl maturing earlier than the boy, and some unknown or little understood function relative to this period of life being responsible for a greater susceptibility to tuberculosis.

While we can divide the susceptibility to tuberculosis into the above mentioned age groups we do not find the age distribution the same relative to the matter of infection. The percentage of infants or young children infected with tuberculosis, according to some authorities, increases from 7 per cent at the age of six months to 75 per cent at the age of six years. We do not find the mortality increasing during the different ages in the same degree; neither do we find the same type of tuberculosis resulting in fatality in the age groups prior to the tenth year and subsequent to the tenth year constant. In fact, most fatal cases up to the tenth year of life are caused from meningeal complications with very little pulmonary disease. After the tenth year the reverse becomes true.

It should be easy to demonstrate from these figures that more attention should be paid to the environment surrounding infants in the first two years of life, which attempt has been so far largely on paper. Investigations made by Hess in New York among 120 homes from which 200 children were admitted to the Farmingdale Preventorium disclosed forty-two other infants under the age of two almost without exception exposed to infection from adults at the homes. At the time of investigation, it is interesting to note that the tuberculous member of the family in over half of these instances was the mother. At first thought it would appear practical to solve the problem by the removal of the mother from the home, but according to Hess this proves practical in very few instances. His solution is the "Children's Preventorium." It would appear also from observations that the question of nutrition not only influences the incidents of fatal tuberculosis, but also affects the incident of infection itself. Hess reported figures that show that in the war countries of Europe during the year 1913, 30 per cent were positive reactors at the age of four and a half and that in 1919, 30 per cent were reactors at the age of two and a half years and the mortality of tuberculosis in the community was 32 per 10,000 individuals, these deaths occurring in childhood under the age of six.

TABLE NO. 1

Deaths from Tuberculosis in New York City (1913-1917) According to Yearly Periods

Age Period (Year)	Pulmonary	Other Forms	Total
0-1	205	1,064	1,269
1-2	184	967	1,151
2-3	98	604	702
3-4	81	359	440
4-5	74	280	354
5-9*	63	134	197
10-14	114	54	168
15-19	514	72	586
20-24	938	78	1,016
25-29	1,069	78	1,147
30-34	1,110	62	1,172
35-39	1,397	59	1,356
40-44	1,058	71	1,129
			10,687

*Figures after five years of age are averages of quinquenniums.

Age Distribution of Patients Reacting to Tuberculin Test

0-6 months	7.8
6-12 months	15.8
1-2 years	17.2
2-3 years	31.1
3-5 years	42.8
5-6 years	75

Bass, in homes for Hebrew infants.

Much has been written relative to the peculiar susceptibility to fatal tuberculosis among children of two years and under. Some account for it by the massive infections due to the intimate association with the mother who may be tuberculous. While it is true that tubercle bacilli fall on the so-called virgin soil at this period of life where opportunities for the development of specific immunity have been lacking, this would appear not altogether the explanation of the high rate of tuberculosis in the first two years of life. For, if the virgin soil explanation was sufficient we would

necessarily expect a high death rate among children at the age of five and six infected for the first time, at which period we find approximately 75 per cent infected by tuberculosis. But at this age period it is as low as any age period in life and does not compare in any degree with fatalities occurring either in the first or second years, or in any of the age periods from twenty to forty. Hess is inclined to explain this in part by the fact that age in itself must confer additional immunity against all infections, tuberculosis as well as scarlet fever and diphtheria. He also comments on the fact that few infants in the first and second years have had any occasion to react against any pathogenic bacteria and that their tissues may be able to respond against tuberculosis infection in later years with a greater degree of success after being stimulated by successful contact with other pathogenic bacteria.

What can be accomplished by the known means of attack against tuberculosis can be rather conclusively shown by past and present anti-tuberculosis campaigns. In 1909 a certain district in Finland was selected for a large-scale experiment in anti-tuberculosis warfare. A mass clinical examination of practically all its inhabitants was made, and then for ten years an anti-tuberculosis campaign was conducted, with a network of dispensaries, propaganda centers, and many other weapons. At the end of this period another mass clinical examination was conducted in the same district, and it was found that the cases of pulmonary tuberculosis had dwindled to a third of their former total number, and it is interesting to note the age periods where this reduction was greatest. In the first decade of life the morbidity was reduced one-quarter, in the second decade a little less than a third, and in the third decade a half. Between the ages of thirty and fifty there was little or no change in the morbidity from tuberculosis, which is as we would expect, for the campaign necessarily influenced the younger generations and represented lessened opportunities for infections with building up of resistance as a protection against active disease.

Doctor Andvord believes that 80 to 90 per cent of fatal cases of pulmonary tuberculosis result from infections within the first three or four years of life and that by deferring the first infection until the fourth year we can force it to assume a permanently benign instead of a slowly virulent character. This contention is supported in Colonel Bushnell's recent work on "Epidemiology of Tuberculosis," where he quotes a foreign investigator who remarks that he has never seen a fatal case of tuberculosis in an individual first infected after the fourth year of life. A statement such as this shows that much study is required to correlate much of the data offered. Very little is being accomplished to handle the problems relating to tuberculosis in children from a state-wide point of view.

Lymanhurst School is to be congratulated in its undertaking and in its accomplishments. It remains for the other portions of the state to follow.

THE STATUS OF PRESENT-DAY METHODS OF EXAMINATION IN THE DIAGNOSIS OF INTESTINAL TUBERCULOSIS*

WILLIS S. LEMON, M.D.
Section on Medicine
Mayo Clinic, Rochester, Minnesota

It is well known that tuberculosis of the intestines may result from the ingestion of food containing tuberculosis bacilli. Such an infection is classified as primary and is relatively much more common in children than in adults. Osler quotes the statistics of the Munich Pathological Institute, which record only one instance of adult primary intestinal tuberculosis in 1,000 necropsies on tuberculous patients against 566 instances of secondary involvement. The findings of Councilman, Mallory and Pearce, in 1901, gave a percentage of 5.9 in which the disease was primary in childhood.

Secondary tuberculosis of the intestines is almost always associated with disease of the lungs, although rarely it may appear as a result of peritoneal tuberculosis or of tuberculosis elsewhere in the body. Not only is it secondary to pulmonary disease, but it is also influenced by the state of activity and the degree of involvement in the lungs. For this reason the condition in the lung completely controls the prognosis of any surgical procedure that may be contemplated for relief of intestinal tuberculosis.

Stengel divides tuberculosis of the intestines into three groups: ulcerative, stenotic and chronic hyperplastic. Of these the stenotic represents the most benign process, in which organization supplants destruction of tissue. Here the symptoms

*Presented before the meeting of the Southern Minnesota Medical Association, Mankato, Minnesota, December, 1922.

are those of chronic intestinal obstruction. Chronic hyperplastic disease is analogous to chronic ulcerative pulmonary tuberculosis. It is localized, usually to the ceco-colon, forms a well defined tumor and except for its age incidence may readily be confused with carcinoma. The vague symptoms of onset are sooner or later replaced by those of stenosis and the signs of tumor. Surgical exploration or the finding of tuberculosis bacilli in the stool provides a diagnosis. Both of these forms are relatively rare. The remaining variety, ulcerative intestinal tuberculosis, is extremely common. At Trudeau Sanitarium, among twenty-two advanced cases, Brown and Sampson found intestinal tuberculosis present in seventeen and doubtful in the five remaining. Among sixty-eight moderately advanced, there were nine cases of intestinal lesions and fifteen in which diagnosis was questionable. Among these doubtful cases, surgery often revealed disease. Intestinal disease was present in seven of eleven incipient cases. In summarizing these results, it is seen that of 101 cases of all types, there were thirty-three with positive evidence of intestinal involvement and twenty in which the diagnoses were not positive, but a few of these were proved positive on surgical exploration. These data agree fairly accurately with Stengel's, who places the incidence of secondary intestinal involvement at more than 50 per cent of all cases of pulmonary tuberculosis.

THE IMPORTANCE OF EARLY DIAGNOSIS FROM THE SURGICAL STANDPOINT

The operability of the stenotic and the chronic hyperplastic type of intestinal tuberculosis has been agreed on by surgeons for many years. Since 1917, however, the operability of the ulcerative type has been under discussion, mainly because of the stimulus given by the splendid work of Archibald, whose results will be quoted at length. Years before, the operation designed by Brown for ulcerative colitis had been used by Coffey, who also had placed the bowel at rest by a short circuiting device. In 1921, he presented patients at his clinic that had been operated on nine or ten years before and were in good health. Starr has had similar experiences and in his report makes a plea for earlier diagnosis so that surgical treatment might prevent the later dangerous symptoms of peritonitis or severe hemorrhage. He relates an instance in which both the bowel and the lung profited by an ileosigmoidostomy and a cecostomy.

DIFFICULTIES OF EARLY DIAGNOSIS

However desirable an early diagnosis may be, it is attended with many difficulties. As late as 1909, Walsh said, "The diagnosis of intestinal tuberculosis cannot be made with the slightest degree of certainty from our present known symptoms." Minor, in the discussion of Archibald's paper, agreed with the author regarding the desirability of early diagnosis, but thought it would be difficult for the clinician to provide the surgeon with patients whose pulmonary disease permitted operation while their intestinal disease was limited to such an extent that operation would be possible. He remarks, "It seems to me the fundamental difficulty is in making a positive diagnosis of tuberculous enteritis; there is no positive means of diagnosing it until it reaches so late a stage that no good can be expected."

Such pessimism has been, until recently, justifiable because, though all agree to the high percentage of incidence among tuberculous patients, yet two facts were present that prevented an early positive opinion: (1) there may be no symptoms referable to the intestine, and (2) such symptoms as appear may occur only late in the progress of the disease. It has been the common experience of surgeons that the disease is far more extensive than the clinician could anticipate. But it is the belief of physicians and surgeons that this complication is responsible for high mortality. It had always seemed to me that the onset of recognizable intestinal disease gave as unfavorable an outlook as that of laryngeal involvement. Archibald, however, believes that there is a psychic reason for late diagnosis. The physician, knowing the suffering entailed to his patient and the certainty of outcome, hesitates to recognize its presence.

Again, these late symptoms are merely those common to enteritis or ulceration from non-tuberculous disease. There is nothing specifically diagnostic in diarrhea, abdominal pain, tenderness, or rigidity. Mucus, or blood-stained mucus, or even frank hemorrhage, does not differentiate tuberculosis, nor does the onset of slight fever, emaciation and weight loss. If, however, the background of the tuberculous patient be kept in mind, then they become significant. With that same background, however, earlier signs will have been observed. These are of importance and should be impressed on all clinicians. Brown's description is so clear and conclusive that it may be quoted. "We feel

that when any patient, even in an incipient stage, begins to do poorly, and shows no increase of pulmonary symptoms or signs, or, what is even more suggestive, a lessening of signs or symptoms referable to the lungs, intestinal complications should be borne in mind."

In an indefinite way, the patient who should be doing well is recognizably doing poorly. His nervous system is less stable and the hopefulness of the tuberculous patient is often displaced by the pessimism of the dyspeptic. He fatigues easily, his appetite gradually fails, and he starts a long process of exclusion of food to discover the cause of the vagrant pains, often cramping in character, distention, nausea, and the sense of discomfort that follow the ingestion of food and disappear when he refrains from eating. The natural result from such abstinence is seen in the progressive, though slow, loss in weight. Then follow the signs that signify bowel involvement, constipation, that appeared in 50 per cent of Carman's cases, normal movements in constipated patients that at first encouraged rather than discouraged, slight diarrhea easily subject to treatment, alternate diarrhea and constipation, signficant of both small and large bowel involvement (Archibald), or continuous diarrhea associated with vomiting and lancinating pains, flatulence, tenderness, and rapid emaciation.

Osler and Starr both mention hemorrhage as an important sign, but it has been absent in my series. Other forms of tuberculosis are characterized by the insidiousness of their onset. The onset of tuberculosis of the intestine does not provide an exception.

Archibald's diagnostic methods include the suspicions of intestinal involvement provoked by the untoward progress of the tuberculous patient whose pulmonary disease fails to explain his symptoms. He comments particularly on the slight increase in fever which persists and on pain below the epigastrium, in the middle or lower abdomen, appearing in late forenoon or afternoon, transient in character, crampy or stabbing, and aggravated by food, though relieved by fasting. A division according to location of the disease is made and certain symptoms have been found which tend to confirm the presence of the disease in the several areas usually invaded by tuberculosis. Archibald emphasizes the importance of constipation as an early symptom, later giving place to diarrhea when ulceration becomes more advanced, or to alternate constipation and diarrhea when the small and large bowel both are affected.

Diarrhea is proportionate to the extent of involvement of the large bowel, while constipation characterizes those cases in which the small bowel is most involved.

Among the signs found on physical examination, the most important is the sense of mass formation, an indefinite induration in the cecocolonic area. In our series this also has been our most trustworthy physical finding.

There is, however, a feeling of general resistance and pain on deep pressure, causing recognizable rigidity in the muscles of the abdominal wall. Distention has been less commonly seen, and active peristalsis only with symptoms of obstruction. Another important finding is the presence of a fecal fistula, or a small open sinus in the surgical scar resulting from the removal of the appendix because of symptoms strongly suggesting simple acute or chronic appendicitis. In such cases a most careful search for the ray-fungus must be made before such a sinus is accepted as presumptive evidence of cecocolonic tuberculosis. The presence of sulphur bodies in the discharge has often been the decisive factor in forming an opinion. The presence of tuberculosis bacilli in the discharge from such sinuses is a very uncertain finding and their absence is not diagnostic.

If the onset is characterized by diarrhea, if the stool examination shows the presence of pus and blood, and the pain is in the rectal region, proctoscopic examination is indicated. Often on such examination fistulas in the anus, or the actual ulcer with its caseated base and sides and deep crater, may be discovered. By this direct method of examination, the proctoscopist may obtain smears for microscopic examination, or tissue for histologic examination.

Inasmuch as, from the history and clinical examination, considerable doubt may exist in the mind of the physician with regard to the diagnosis, it was thought possible that the laboratory might be of assistance in reaching an early and accurate diagnosis. This seemed to be the opinion of Lichtheim, who, in 1883, was the first to demonstrate tuberculosis bacilli in stools and who believed that they were positive evidence of intestinal lesion. However, in later years, it was proved by a large number of observers, including Bodo, Phillips, Porter, Laird, Kyte, and Klose, that the mere pres-

ence of tuberculosis bacilli in the stools was not indicative of a tuberculous lesion of the intestines. For example, Phillips and Porter, in their experiments, using the method of staining proposed by Uhlenhuth and Xylander, found tuberculosis bacilli in the stool in seventy-nine of 100 cases; findings were negative in twenty-one. All of the nine non-tuberculous cases examined were negative. All the patients who had bacilli in the sputum likewise had bacilli in the feces, with one exception. Of the forty-two patients without evidence of bacilli in the sputum, twenty-nine gave positive evidence of bacilli in the feces. Of twenty-four patients from whom sputum was not obtainable, it was found that seventeen had bacilli in the feces. In my experience tuberculosis bacilli have not been found in the feces of non-tuberculous patients. Because of the forty-two patients with negative sputum and the twenty-four patients without sputum, Phillip and Porter were led to believe not only that the presence of tuberculosis bacilli in the feces is independent of the presence of intestinal lesion, but that patients with pulmonary tuberculosis without positive sputum or with no sputum should have their feces examined. They believe that examination of feces may be of aid in diagnosis in cases in which tuberculosis is merely suspected. Laird, Kyte, and Stewart, working in Saranac, called attention to the various substances that may contain acid-fast bacilli, and quoted various writers who have discovered their presence in the feces. They likewise used the antiformin method in a manner similar to that used by Phillip and Porter, but later found that equally good results could be obtained by examining the stools untreated by antiformin. They, however, used both methods, one to control the other. They concluded that tuberculosis bacilli are found in feces of patients with positive sputum, but not if the sputum is negative, in this way differing from Phillip and Porter and also from Rosenberger and Wilson. They believe that sputum appears in the bowel because of the unconscious swallowing of saliva during sleep. Chevalier Jackson, in speaking of the effect of foreign bodies in the upper respiratory passages and esophagus, mentions the surprising quantity of sputum which may be swallowed in this manner. These observers believe that the bacilli do not stay in the stomach long enough to be destroyed. It is conceded, of course, that bacilli may come from ulcers in the bowel, and can be found in cases of tuberculous enteritis, and these writers are also willing to concede the fact that tuberculosis bacilli may appear in the blood stream although they believe that the bacteremia theory hardly explains the frequency of the incidence. Klose, in 1910, had worked considerably on this problem and was in agreement with these authors, inasmuch as he found bacilli in the stools of fifty-five of sixty patients with positive sputum, but did not find them in the stools of patients with negative sputum. Alexander, in the same year, examined eighty-one cases of tuberculosis, including forty-five pulmonary; in fifty-two positive feces were found; in this group were thirty-eight of pulmonary involvement. He used animal inoculations and from twenty-four patients with advanced tuberculosis, he obtained positive evidence in twenty-three instances following the injection of the feces. This seems a surprisingly large percentage when one considers that the bacteria in the feces are of low vitality or dead.[22] In the culture experiments of Laird, Kyte, and Stewart, the results were all negative. In 129 non-tuberculous cases, there was no incidence of tuberculosis bacilli in the stools. Wilson and Rosenberger, in their studies, record by far the largest percentage of tuberculosis bacilli-bearing feces in cases in which the sputum was positive, their records giving 100 per cent in 100 cases.

Dr. George Mannheimer, in discussing Dr. Archibald's paper, suggested that stools be examined for mucus, blood, pus, and tissue shreds as well as bacteria, and proposed the method of irrigation of the bowel by syphonage after spontaneous bowel movement, and examination of the sediment of the wash water. He believed such a method to be an improvement over that for the untreated feces.

From the results of the experiments of these various observers it would appear that 75 to 95 per cent of all cases of active pulmonary tuberculosis with bacilli in the sputum likewise would show evidence of bacilli in the stools. For this reason, no particular help can be looked for from the laboratory in making a diagnosis of tuberculous enteritis.

AIDS TO DIAGNOSIS

It is difficult to place a value on any method of arriving at the truth. Each correlates with the other and is necessary in interpreting the findings. Undoubtedly, the roentgenologic examination is the most precise method at our disposal and probably will demonstrate lesions before any other. Yet Carman finds that interpretation is not without difficulty because there are no pathognomonic roent-

gen signs. The filling defect and the absence of the normal barium shadow in the cecocolon are signs of any ulcerative lesion. If, however, the patient is being examined with the thought of his tuberculosis always in mind, such findings take on the certainty of diagnosis. There is a definite predilection for the ileocecal coil and a lesion here is always suspected to be tuberculous when the patient has not yet reached cancer age, and the more so, if he has either active or latent pulmonary disease. Fully 85 per cent of all cases of intestinal tuberculosis are found in the ileocecal area.[11]

Carman prefers the enema to the barium meal, but in general the technic is the same as for any other intestinal disease. He prefers the enema, because it demonstrates small irregularities of contour by outlining the bowel wall. The barium meal is unevenly distributed and irregularities, especially if of small size, cannot be distinguished from those of disease. On the other hand, Sampson uses the meal in preference to the enema, and has made positive findings on observing the progress of the barium through the bowel when the colon ray showed no evidence of disease. He postulates three rules that, in his opinion, demonstrate hypermotility: (1) complete evacuation from twenty to twenty-four hours, (2) head of column in sigmoid in six hours, and (3) cecum or cecocolon the seat of this hypermotility and the bowel spastic in appearance. The filling defects he describes under four main headings: (1) the smooth haustral sacculations are absent, (2) the bowel has a distinctly ragged appearance, and the affected areas are only partly filled, (3) gravity pressure increase is required to fill the diseased areas which then show string-like irregular shadows extending from the normal into the abnormal bowel, and (4) spasms appear and barium moves distally, rather rapidly. These results were obtained independently and without knowing of Stierlin's work which was reported in 1911. Stierlin believed that the absence of barium at areas where it should have been, suggested hypermotility, and diagnosed the presence of ulceration at the site where the shadow was absent. His results were checked by operations performed by Wilms. To Stierlin belongs the credit for this observation, while, in America, Pirie was the first to discover its presence in cecocolonic tuberculosis. His description is quoted verbatim by Archibald. Inasmuch as the Saranac observers were working in close coöperation with Archibald and Pirie, the credit for the observation seems to belong to them all as a group.

Certainly the results have stimulated more interest in the diagnosis of intestinal tuberculosis than any previous work. They have provided the clinician with another link in the chain of circumstantial evidence required to give a positive opinion regarding the incidence of tuberculous disease in the bowel.

Carman bases his opinion on three signs: (1) filling defects, (2) spastic phenomena, and (3) obstruction. The conclusions reached from his observations are:

1. Under pressure of the enema the cecum and ascending colon are seen to fill irregularly and are narrowed in their transverse diameter.
2. Normal haustral markings are absent.
3. Bauhin's valve is incompetent.
4. Relief of the enema pressure is accompanied by emptying of involved areas which remain empty, while the remainder of the colon may remain filled.
5. The filling defect and absence of barium shadow in the cecum and ascending colon is not entirely characteristic because it is seen in ulcerative carcinoma of the cecum and in ulcerative colitis.
6. Such a filling defect should always suggest tuberculosis and the disease should be searched for elsewhere.
7. If lungs are tuberculous, the lesion is most likely tuberculous.
8. Hypermotility is not a proper term since in 50 per cent of Carman's cases there was constipation and delayed motility. In his opinion, the appearance of hypermotility is due to diffuse infiltration of the bowel producing rigidity, and the normal inhibition function of the bowel is absent.
9. Under the surgeon's observation, the spasm is in proportion to the size of the lesion. In small solitary lesions, the spasm is local, like the incisura of ulcer of the stomach, and can be visualized, although the lesion is not demonstrable. "Spasm of this type is intrinsic in origin, constant in situation; it is present at a second examination and cannot be effaced by antispasmodics."

CONCLUSIONS

The diagnosis of intestinal tuberculosis is made on circumstantial evidence collected from the history of the ailment, the examination of the patient, the laboratory data afforded especially by: (1) direct examination of rectum through the proc-

toscope; (2) the study of material collected at the proctoscopic examination; (3) the examination of the stools for tuberculosis bacilli, especially in cases of healed or latent pulmonary disease in which the sputum is negative, or in which there is no demonstrable pulmonary disease; (4) the examination of stools for evidence of ulceration, as in other ulcerative conditions; (5) the very definite and accurate observations of the roentgenologist; in view of the frequency with which the intestine is affected and the absence of symptoms or their confusing character, such an examination assumes the proportions of greatest worth and is desirable in all cases of pulmonary tuberculosis, and (6) the microscopic examination of tissue removed by the surgeon in operations performed from choice when the diagnosis is certain, or when advisable because of severity of symptoms, or when an opinion cannot be given with certainty. Appendicitis, intestinal obstruction and carcinoma are common members of the differential group to which tuberculosis of the cecocolon belongs.

The fundamental principle in diagnosis depends on the interpretation of symptoms, signs and laboratory findings, in the general consideration of probability as applied to the tuberculous individual.

BIBLIOGRAPHY

1. Alexander, D. M.: An investigation into the acid-fast bacteria found in human feces with special reference to their presence in cases of tuberculosis. Jour. Hyg., 1910, x, 37-48.
2. Archibald, E.: The rôle of surgery in the treatment of intestinal tuberculosis. Tr. Nat. Assn. Study and Prevention Tuberc., 1917, xiii, 117-134.
3. Bodo: Quoted by Brown and Sampson.
4. Brown, L., and Sampson, H. L.: The early roentgen diagnosis of ulcerative tuberculous colitis. Am. Jour. Roentgenol., 1919, vi, 625-640.
5. Brown, L., and Sampson, H. L.: The early roentgen diagnosis of ulcerative tuberculous colitis. Jour. Am. Med. Assn., 1919, lxxiii, 77-85.
6. Brown, L., and Smith, D.: The cultivation of tubercle bacilli directly from sputum by the use of antiformin. Jour. Med. Res., 1910, xxii, 517-527.
7. Carman, R. D.: The roentgen diagnosis of diseases of the alimentary canal. 2 ed., Philadelphia, Saunders, 1920, 676 pp.
8. Coffey, R. C.: Surgery of the large bowel. Internat. Clin., 1921, iv, 20-42.
9. Councilman, W. T., Mallory, F. B., and Pearce, R. M.: A study of the bacteriology and pathology of two hundred and twenty fatal cases of diphtheria. n.p.n.d., 183 pp.
10. Engleson, H.: Ein Beitrag zur Frage vom Vorkommen der Tuberkebazillen in der Fazes. Eine neue Methode zum Nachweis derselben. Beitr. z. Klin. d. Tuberk., 1915, xxxv, 37-62.
11. Fenwick, W. S., and Dodwell, P. R.: Perforation of the intestine in phthisis. Lancet, 1892, ii, 133, 190.
12. Jackson, C.: Bronchoscopic extraction of foreign bodies from lungs and esophagus. Ann. Surg., 1922, lxxv, 1-30.
13. Klose, F.: Ist der Nachweis von Tuberkebazillen im Stuhl von Phthisikern für die Diagnose Darmtuberkulose verwertbar? München med. Wchnschr., 1910, lvii, 133.
14. Laird, A. T., Kite, G. L., and Stewart, D. A.: The presence of tubercle bacilli in the feces. Jour. Med. Res., 1913, xxix, 31-42.
15. Lichtheim, L.: Zur diagnostichen Verwerthung der Tuberkelbacillen. Fortschr. de Med., 1883, i, 4-10. Discussion on paper by Archibald.
16. Mannheimer, G.: Tr. Nat. Assn. Study and Prevention Tuberc., 1917, xiii, 132.
17. Minor, C. L.: Discussion on paper by Archibald: The rôle of surgery in the treatment of intestinal tuberculosis. Tr. Nat. Assn. Study and Prevention Tuberc., 1917, xiii, 131.
18. Osler, W.: The principles and practice of medicine. New York, Appleton, 1918, 1225 pp.
19. Philip, R. W., and Porter, A. E.: Tubercle bacilli in the feces in tuberculosis. Brit. Med. Jour., 1910, ii, 184-185.
20. Pirie: Quoted by Archibald.
21. Starr, F. N. G.: Surgical tuberculosis. Can. Med. Assn. Jour., 1920, x, 1096-1104.
22. Nothnagel, H.: (Edited by Stengel, A.) Diseases of the intestines and peritoneum. Philadelphia, Saunders, 1905, vi, 1032 pp.
23. Stierlin, E.: Die Radiographie in der Diagnostik der Ileozoekaltuberkulose und anderer Krankheiten des Dickdarms. München med. Wchnschr., 1911, lviii, 1231-1235.
24. Uhlenhuth and Xylander: Antiformin, ein bakterienauflösendes Desinfektionsmittel. Berl. klin. Wchnschr., 1908, xlv, 1346-1349.
25. Walsh, J.: Diagnosis of intestinal tuberculosis. New York Med. Jour., 1909, xc, 100-102.
26. White, B., Avery, O. T., and Hutton, R. L.: Concerning the bacteriemic theory of tuberculosis. Jour. Med. Res., 1910, xxiii, 95-105.
27. Willson, R. N., and Rosenberger, R. C.: The duration of the actively infectious stage of tuberculosis. Jour. Am. Med. Assn., 1909, lii, 449-455.

DISCUSSION

DR. F. W. WITTICH, Minneapolis: I was fortunate in being able to read Doctor Lemon's paper before the meeting and hope that when it appears in print you will all avail yourselves of the opportunity to read it because it is much more complete than he has taken the time to give this morning. I think he should be congratulated on giving such a clear cut and succinct résumé of the present status of the diagnosis of intestinal tuberculosis.

This problem of primary and secondary infection is, of course, being revived and I think the conclusions are quite

safe that primary intestinal tuberculosis is relatively uncommon, higher of course in children than in adults.

Doctor Robinson, a couple of years ago at the Mississippi Valley Conference, showed where in Scotland, while visiting there, the incidence of tuberculosis, particularly in children, was much higher in districts where there was no compulsory milch cow inspection. It was so high that he said that after being there for a short time and studying the map of the Health Department, he decided not to drink any more milk.

The incidence of tuberculosis of the intestines, either of the mesentery glands or tuberculous ulceration of other members may be absolutely symptomless, and, as Doctor Lemon has pointed out, is relatively very high even in early cases, conservatively possibly 50 per cent, so that the practical lesson we learn is that any patient coming into the office for examination for tuberculosis should have a thorough abdominal examination as well, augmented by the fluoroscope, if this is available. In a patient coming in with definite frank tuberculosis of the lungs and having some abdominal distress, a slight loss of weight, with the symptoms referable as Doctor Lemon has just described so carefully, one should suspect tuberculosis of the abdomen, not only from the diagnostic standpoint but in the hope that we may prolong the patient's life by early recognition and possible surgical interference.

I would like to report a recent advanced pulmonary case, a boy who had had collapse therapy. He was doing well with his tuberculosis apparently when he became rather grumpy about his food, commenced to get finicky and decided that all foods distressed him. The weight loss was out of proportion to the physical findings. There was no extension of the disease in the opposite lung, yet his general condition became progressively worse. Presently definite pains developed in the abdomen, especially over the cecal region, there was some rigidity, constipation predominated although he did have occasional loose stools. In other words the picture was that of tuberculosis of the abdomen. Operation was postponed for a few days, when the boy became very ill with a sudden acute attack. The surgeons opened the abdomen and found a ruptured appendix, with no tuberculosis in the abdomen at all. There were typical symptoms of intestinal tuberculosis as I would interpret them, and yet were all due to an appendicitis. An interesting thing about their food and peculiar psychic disturbances and depression is sometimes their perverted appetites. We frequently find that these patients will not do well on gruels, chicken broth and things like that, but manage potatoes and gravy very well. A rather peculiar thing about some of our cases was that they could eat coarse food and get no abdominal distress. Occasionally a laxative in an otherwise constipated patient will flare up into profuse diarrhea, which will help in the diagnosis. Seventy per cent of all cases of pulmonary tuberculosis on the average have positive sputums and at least sixty to eighty per cent of these have positive evidence in the feces. The greatest value in the diagnosis is probably the *x*-ray. Briefly, one might say a patient with some pulmonary or extra-intestinal findings of tuberculosis elsewhere in the body who develops indefinite vagrant pains in the lower abdomen, and whose condition becomes worse without increase in the pulmonary signs, should cause one to suspect intestinal involvement. If definite physical findings are present such as tenderness, resistance, gas, constipation or diarrhea this diagnosis is suggested. And if the *x*-ray shows spastic areas, hypermotility, irregularities in filling, etc., although not pathognomonic of the condition, the diagnosis of intestinal tuberculosis is warranted.

Dr. Everett K. Geer, St. Paul: Personally I want to thank Doctor Lemon for this paper because up to the last two or three years the status of intestinal tuberculosis was very similar to that of pulmonary tuberculosis twenty years ago. At that time the diagnosis of tuberculosis of the lungs was not made until emaciation had occurred and the case had advanced so far that the patient's neighbors had made the diagnosis before he went to a physician. That was about the status of intestinal tuberculosis until the past two or three years, when roentgenological evidence has made the condition so very clear.

To my mind one of the most significant things in suspecting intestinal tuberculosis is the fact that we have a patient with a lung lesion, which is either staying stationary or retrogressing, and the patient is running an irregular temperature, losing weight, etc., and, as Doctor Lemon has pointed out, frequently with absolutely no symptoms pointing to the abdomen. But the fact that he is pursuing a progressive course, with the lung lesion remaining stationary or retrogressing, should make us suspect intestinal tuberculosis. I think one of the earliest symptoms in my experience has been the absolute loss of appetite. If you will *x*-ray these people, as a rule you will find your typical picture of intestinal tuberculosis.

Furthermore, we know that these intestinal lesions are curable. I was taught that intestinal tuberculosis invariably led to a fatal termination. We know now that this is not true. This subject is assuming such an important place that we are beginning to routinely give our patients barium meals and enemas in an attempt to locate early lesions, and when we do a great deal can be done, not only in a surgical but a medical way. They are put on the proper diet, and also on heliotherapy, either sunlight or Alpine lamp, which will do more for them than any other thing we know of at the present time.

Dr. W. S. Lemon, Rochester, closing: I have only three things to say. In the first place, this condition of the bowel may appear in persons who have an extremely small amount of trouble in the lungs, when the lung may be reported as a closed lesion. I think this is important because we are inclined to believe that the activity of the disease in the lungs is of essential significance.

In the second place, I think that all patients with symptoms similar to those I have tried to describe should have the benefit of an *x*-ray examination as well as a complete physical examination.

Thirdly, I think the stool should be examined, because in my experience it has been a help. In those particular cases in which I was unable to find positive sputum I have found positive stool and been able to make a diagnosis.

As Doctor Geer has said, it is becoming more and more an accepted fact that medical management of these cases is of great value, and the Alpine lamp does relieve these people of pain and takes away the dread and horror of the condition, which we have in years past always considered a fatal ending of tuberculosis.

SURGICAL TREATMENT OF THE URETER IN TUBERCULOSIS OF THE KIDNEY*

WALTMAN WALTERS, M.D.
Section on Surgery
Mayo Clinic, Rochester, Minn.

Between 1890 and 1900 nephrectomy was successfully established as the correct treatment for primary renal tuberculosis, largely through the efforts of Tuffier, Mayo, Morris, Israel and Albarran.

In a study of 532 patients operated on for renal tuberculosis at the Mayo Clinic before January, 1918, Braasch found the operative mortality to be a negligible factor, only 1.03 per cent. The late mortality (five years or less) is approximately 20 per cent. This leaves a prognosis of recovery in 80 per cent. Of the patients living, 20 per cent said they had not entirely recovered from their bladder symptoms, so that a complete cure, including cessation of urinary symptoms, may be expected in fully 60 per cent.

The treatment of the ureter at the time of the nephrectomy for primary renal tuberculosis is extremely important. Prolonged drainage of the operative wound compromises a successful operation; for although the bladder may no longer be a source of trouble, the visible, unhealed, draining wound will be a new cause for anxiety.

The general opinion prevails that the ureter, in most instances, is the source of the drainage following removal of the tuberculous kidney, for it also is involved in the tuberculous process. In the early stages of tuberculosis of the kidney there is little change in the appearance of the ureter, but as the infection advances the ureter becomes enlarged, thickened, boggy, pipe-stemmed or strictured.

Several methods of treating the tuberculous ureter at the time of nephrectomy have been suggested. In 1915, Dr. W. J. Mayo asserted that only in 5 per cent of the cases of tuberculosis of the kidney is it necessary to remove the ureters, that these usually are cases in which strictures exist in the lower portion of the ureter close to its juncture with the bladder, and the ureters should be removed with the kidney to a point below the stricture at the primary operation.

*Read before the Southern Minnesota Medical Association, Mankato, Minnesota, December 4-5, 1922.

In cases of tuberculous ureters without strictures, various methods are used, such as ligation of the ureter with chromic catgut and cautery sterilization of the stump. In some instances, five to ten minims of 95 per cent carbolic acid is injected into the lumen of the pipe-stem type of ureter, with ligation of the cut end, and closure of the incision without drainage. Judd advocates ligation and threading of the end of the infected tuberculous ureter into a rubber tube which he allows to project from the lower angle of the incision for from six to ten days. This allows primary healing of the wound, and, should the ureter drain, the hollow tube or the temporary sinus left by it forms an easy path of exodus and does not interfere with the healing of the remainder of the wound.

END RESULTS

In order to compare the end results of the various methods of treatment, letters were sent to all patients on whom nephrectomies for renal tuberculosis had been performed between 1915 and 1920. Replies have been received from 282 patients in the last few months.

Ligation of the ureter with catgut and sterilization of the cut end with the cautery seems to have been the most effective means of treating the tuberculous ureters that were not sufficiently strictured to produce distension. In 48 per cent of these cases there was primary union of the incision before the patient was dismissed from observation. The incisions remained healed without subsequent drainage. Twenty-seven per cent of patients similarly treated, and whose incisions were draining when they were dismissed (from three to five weeks after operation), report subsequent permanent healing of their wounds.

As might be expected, one of the least effective methods of treating the tuberculous ureter from the standpoint of wound healing, is sealing the cut end of the ureter for from 48 to 72 hours by leaving two pairs of forceps on the renal pedicle which is too short to be ligated accurately and securely. This method was necessary in 28 cases, and in only six (21 per cent) had the drainage ceased before the patient left Rochester. In 13 other cases (48 per cent) the incision healed after the patients had been dismissed from observation. Although the forceps method was used only as an emergency because of the short pedicle it is important since it illustrates the fact that these incisions, if left

open by a drainage tube or otherwise, may permit secondary infection in the wound, retarding primary union.

Another method used in the Clinic in the last few years was suturing the cut end of the ureter to the margin of the skin at the lower angle of the incision. This allowed escape of the contents of the ureters to the outside without contamination of the wound. This method has now been practically discarded in the Clinic, and it is interesting to note by actual comparison of the various methods, used for a period of seven years, that this one is ineffective, as measured by primary wound healing, since only 18 per cent healed by primary union before the patients left the Clinic, although an additional 53 per cent healed subsequently.

The results of partial or complete ureterectomy with nephrectomy, as measured by wound healing and ultimate end results in 14 patients with stricture of the tuberculous ureter insufficient to produce obstruction and distension, do not warrant the routine employment of the procedure.

The cases of demonstrable strictured and distended tuberculous ureters obviously form a separate group, since the stricture forms a closed sac if it is distal to the cut end of the ureter. However, this uncommon condition was found at operation in only nine (3 per cent) of the 282 cases of tuberculosis of the kidney. Dr. W. J. Mayo now removes all ureters with the kidney if the strictured ureter is distended to a point below the stricture. In the other cases he clamps the ureter with a hemostat without separating it from its fatty sheath, in order not to disturb its circumureteral circulation, divides it with the cautery and drops it back without a ligature, which he believes might act as a foreign body. After thorough hemostasis the incision is closed without drainage.

In most instances improvement in bladder symptoms and improvement in the general condition of the patient are not retarded by a draining wound, and conversely patients whose symptoms have not improved may or may not have draining wounds. This is true regardless of the method of treating the ureter at the time of the nephrectomy.

In conclusion it may be said that following nephrectomy for primary renal tuberculosis the method of compression of the stem of the ureter, ligation with catgut and sterilization of the cut end by the cautery, produces the best end results as measured by primary wound healing. Improvement takes place in bladder symptoms and in general health independent of drainage of the ureter wound after nephrectomy.

BIBLIOGRAPHY

1. Balfour, D. C.: Tuberculosis of the kidneys. Northwest Lancet, 1911, xxxi, 513-515.
2. Braasch, W. F.: Clinical observations from 203 patients operated on for renal tuberculosis. Jour. Am. Med. Assn., 1912, lviii, 397-401.
3. Braasch, W. F.: Occluded renal tuberculosis. Jour. Am. Med. Assn., 1920, lxxv, 1307-1309.
4. D'Agata, G.: The ureter with renal tuberculosis. Arch. ital. d. chir., 1921, iii, 367. Abstr.: Jour. Am. Med. Assn., 1921, lxxvii, 411.
5. Dodson, A. I.: Tuberculosis of the kidney. Virginia Med. Month., 1922, xlviii, 574-578.
6. Eisendrath, D. N.: The diagnosis of tuberculosis of the kidney and the technic of nephrectomy. Surg. Clin. Chicago, 1920, iv, 401-423.
7. Herman, L.: Some difficulties in the diagnosis and treatment of unilateral renal tuberculosis. Ann. Surg., 1919, lxx, 203-209.
8. Hess, E.: Renal tuberculosis. Urol. and Cutan. Rev., 1922, xxvi, 286-290.
9. Jones, W., and Pearse, M. R.: Tuberculosis of the kidney and ureter. Canadian Med. Assn. Jour., 1920, x, 28-33.
10. Judd, E. S.: Surgery of the kidney. Minn. Med., 1920, iii, 221-227.
11. Keene, F. E.: Unilateral renal tuberculosis associated with stricture of ureter, hydro-ureter, and hydronephrosis. Surg. Clin. N. Am., 1922, ii, 287-298.
12. McKenna, S. M.: Tuberculosis of the kidney. Surg. Clin. Chicago, 1919, iii, 147.
13. Mayo, W. J.: Procedures following nephectomy. I. The transperitoneal closure of duodenal fistulas following nephrectomy. Jour. Am. Med. Assn., 1915, lxiv, 953-957.
14. Mayo, W. J.: Nephrectomy without drainage for tuberculous kidney. Surg., Gynec. and Obst., 1912, xv, 523-524.
15. Mayo, W. J.: The removal of stones from the kidney. Surg., Gynec. and Obst., 1917, xxiv, 1-8.
16. Wildbolz: [Results of nephrectomy for renal tuberculosis.] Ztschr. f. urol. Chir., 1921, viii, 17. Abstr.: Jour. Am. Med. Assn., 1922, lxxviii, 77.

DISCUSSION

DR. ARNOLD SCHWYZER, St. Paul: This is indeed a very interesting subject for the surgeon. It is very often interesting to watch the historical development of surgery in a certain field, and in this field for instance it is quite interesting. First, we only get the worst late cases; these only are relegated to surgery; and then a lot of things are first done that are unnecessary, some that are even harmful. After we learn a little more about the patho-

logical physiology then we discard more of the unnecessary and harmful things, and that is the way it has been in this field. I remember, for instance, my first nephrectomy for renal tuberculosis. This was in 1896. The case was very far gone and the kidney was the size of a grapefruit. The patient, a woman, had for over a year urinated every few minutes day and night. A nephrectomy was done and the ureter could not even be isolated from the thick mass, but the wound healed, though we did not do anything to the ureter. The patient married later and has remained well. Now these things were universally experienced. The surgeons gradually learned something new by doing surgery on the kidney. Through dietetic and general management we can get great improvement in renal tuberculosis, but we know that, if once materially started, as a rule it keeps on until surgery is the only procedure left. Then the ureters were not removed in a number of cases because removal was impossible. And then the one interesting fact came out gradually, the fact that ruled the whole development of surgery on the kidney, that was the tendency to healing of the lower urinary tract; even a very large thick ureter and a very miserably affected bladder have great tendency to heal as soon as the kidney is out. It is an interesting fact that we have an entirely different tendency to healing in the ureter and bladder from the tuberculosis in the kidney. At first we burned out the ureter, and even now some European surgeons go down into it with the cautery and burn it out. Kuemmel, one of the foremost kidney surgeons, does that yet. When we have a marked dilatation of the ureter, it is a bad thing to leave it in. I might mention that I had once devised a method of total ureterectomy in women, which I still think is very neat and the simplest way. We divide the lowest part through a small incision in the vagina. With a little incision you can cut it off there, and then through the nephrectomy wound, which does not need to be made longer than it is anyway for excision of the kidney, you can free the ureter with the fingers and work it up and down and can easily get it out with the kidney. Ureterectomy is a dangerous procedure when the parts are friable close to the bladder as in an advanced case. If you have a thick union between the bladder and ureter, you are liable to get a fistula. Where you have a dilated ureter, removal down to the stricture is best. In the early days the ureter was taken out if possible. This is not done routinely at the present time. It is still mostly brought out at the lower angle of the wound. I think this is a good procedure. I tie it off and inject some pure carbolic acid into the course of the ureter and bring it out at the lower angle of the wound. But sometimes you get a long-lasting fistula and these patients must not figure that they are going to be well in a year. I noticed a long time ago that a bad bladder will not be right in two years, and have told all my patients that they must figure on two and one-half years. In my experience they often improve satisfactorily only after that length of time. But if you have a fistula that runs for two years, it is annoying to the patient and to the surgeon. For that reason if you can cut off the tuberculous ureter and leave it in, this, of course, should be done. The simplest procedure now is the one you have heard described, which Doctor Mayo does. He does not disturb the tissues around the ureter. If you have no mixed infection in there, it ought to heal.

Dr. Alexander R. Colvin, St. Paul: I was struck with the force of Doctor Schwyzer's remarks about the history of the treatment of the tuberculous ureter and I thought of an expression I heard used when an interne came in and asked the chief what was good for tuberculosis of the lung; the chief hesitated for a moment and then said, "Read the history of the treatment of tuberculosis." Now, since that time the history of the treatment of tuberculosis has changed a good deal. Apart from constitutional measures the question of putting the affected organs out of function seems to be the desirable thing. In the tuberculous ureter, on removal of the kidney there are no more functional demands made upon it and so it seems to heal. In tuberculosis of the joints, particularly in adults, if we can excise the joints and so have no functional demand in the region, the bone ends usually unite and the tuberculosis is cured in the majority of cases. That is due to the fact that no more functional demands are made in that region. And so in tuberculosis of the ureter; as a matter of fact we don't know what the ureter is like below unless we have investigated from one end to the other. I remember seeing an autopsy on a patient who had died of miliary tuberculosis and he had a large tuberculous kidney; about two-thirds of the way down the ureter there was a tuberculous area of about half an inch in width, with no other tuberculous lesion in the course of the ureter. And so in all probability in a good many cases of tuberculous ureters, on removal of the tuberculous kidney we leave lesions that we know nothing of and which heal because no functional demands are ever made upon them.

Dr. Victor J. La Rose, Bismarck: My experience does not extend over a large enough number of cases to draw definite conclusions, but we have had a sufficient number to try out the different methods that have been outlined and the result is that we have adopted a procedure standardized up to a certain extent. That is, in early cases where the infection is confined to the pelvis or papillæ of the kidney, with no demonstrable change in the ureter, we cut through the ureter with cautery, inject phenol into the lumen, tie it off with catgut and drop it back into the wound. In cases further advanced where we have pyelonephrosis, more or less abscess and pus, with changes in the ureter, we have been removing the ureter as far down as we can conveniently and using the cautery for section. We have also had cases where we have pulled the ureter out of the wound, or through a stab wound away from the original incision, with the idea of treating the ureter for a time by injecting phenol, but I would not say that that had any advantage over the other methods of treatment. I feel that the treatment for the ureter is the carbolic acid injection in the earlier cases and cautery resection in the later cases.

Dr. Waltman Walters, Rochester (closing): I would like to take this opportunity to thank Doctor Braasch for the opportunity to work on this material, which was a statistical study, and I wish also to thank the gentlemen who have discussed the paper. The study was undertaken because of the various surgical methods used and merely reviews the results collectively.

A CASE OF ACUTE DELIRIUM APPARENTLY DUE TO BROMIDIA POISONING

C. EUGENE RIGGS, M.D.
St. Paul

Mr. E. was referred to me by Dr. A. P. Andrus, Ashland, Wisconsin, September 21, 1922. He was 67 years of age. Mother died in 75th year; father in 65th year. Used alcohol excessively until 1907. Thirty years ago a physician prescribed Bromidia for him; he has been using it for sleep as inclination directed, ever since. How long he had taken the toxic doses, varying from .5 oz. to 1 oz. at bedhour, it was impossible to ascertain; he stated several weeks. He was acutely delirious, disoriented as to time and place, confused, incoherent; he had no recollection as to how he came to the hospital and did not know his son and daughter who accompanied him. His attention could not be fixed; he talked constantly; was noisy; pulled off the bedclothes and mattress; saw objects on walls and floor; was always wanting to go somewhere and was so acutely disturbed that restraint was required. He talked about a railroad; said there was a washout and a terrible wreck and that his son was dead and his daughter, who was single, was married. A man of very moderate means, he talked of his home by the lake and his great wealth; he could not remember from one minute to another what was told him. The falsifications and fabrications of the Korsakoff syndrome were marked. He picked at the bed-clothes, thought he was dressing himself, and mistook the nurses for old acquaintances.

He frequently asked for Bromidia. At one time for 48 hours he lay in a semi-comatose state; only once was there fever; temperature 101 for a few hours; pulse varied between 66 and 76; respiration 18; blood pressure 140 systolic, 85 diastolic; hemoglobin 78 per cent. Red blood cells 4,300,000; white blood cells 10,000; urine negative; there was a marked tremor similar to that of delirium tremens; and an intractable insomnia. October 9th and 11th there occurred short lucid periods. These increased in frequency and duration until he cleared up mentally. The memory of his delusive ideas was very fragmentary. All through his wild delirium he was good-natured and usually tractable. Maniacal excitement or depression may be present in these cases, there being an undoubted tendency to fatuity. On November 4th, he experienced his first attack of depression; this occurred usually in the morning; afternoons he would be apparently normal. He lost sixty pounds; his original weight being 263 pounds. When he left the hospital November 16th he was in fair physical condition, but the depression and insomnia were still marked. He manifested illusions and hallucinations of sight but there were no schizophrenic symptoms as in Dr. Bennett's case.[1] Mandsley once said that "chloral was crystallized hell" and "Bromidia," says the report of the Council of Pharmacy and Chemistry May 16, 1914, "is a vicious chloral preparation masquerading under a misleading name." Since the advent of the newer hypnotics, chloral has retired into "innocuous desuetude." Only by referring to the older text-books does one find any reference to chloral insanity. Three deaths have been reported as due to Bromidia poisoning. A search of the literature for the past twenty-five years has shown no additional cases to those which were reported by the Council of Pharmacy and Chemistry.[2] In this report there were short abstracts of two cases but reference only was made to that of Dr. N. S. Lincoln.[3] His patient, a woman, had formed the Bromidia habit. After her death, there was found a two-ounce bottle of Bromidia which had been purchased that day, and it was learned that during the preceding twenty days the bottle had been filled four times.

It is absurd to suppose that skillful pharmacists have failed to put up a non-proprietary preparation having the alleged composition of Bromidia where its manufacturers have succeeded. In the national formulary prototype of this preparation we are told that the cannabis indica is filtered out. The synergistic action, therefore, of the allied narcotics in this nostrum, need no longer concern us. The chloral content alone is to be considered.

The prescription of Bromidia in acute alcoholism, which is quite extensively done, is greatly to be deprecated; affecting as it does the heart and nervous system it is a most dangerous agent. The patient in the meantime stands in great danger of becoming a Bromidia addict—the victim of another vicious habit. One thing should be borne in mind—that each fluid dram of Bromidia contains

about 12 grains of chloral hydrate, and chloral hydrate is a habit-forming, death-dealing drug.

REFERENCES

1. Bennett, A. E.: Acute delirium apparently due to bromidia poisoning. Jour. Am. Med. Assn., Sept. 23, 1922.
2. Report of council of pharmacy and chemistry. Jour. Am. Med. Assn., May 16, 1914.
3. Lincoln, N. S.: Poisoning by bromidia. Jour. Am. Med. Assn., July 9, 1887.

ULCER OF THE STOMACH AND DUODENUM*

E. Starr Judd, M.D.
Rochester, Minnesota

Many theories have been advanced to explain the occurrence of chronic ulceration in the stomach and duodenum, and yet a definite cause for the condition has not been established. Ulcerations in this part of the gastro-intestinal tract differ in many respects from those in other regions. The frequency with which ulcers are found in the stomach and duodenum need not be emphasized except in contrast with the infrequency with which similar lesions occur elsewhere. Just why these ulcerations are peculiar to this segment of the gastro-intestinal tract has not been satisfactorily explained, although certain elements are found in these tissues and in the secretions which are not found elsewhere. Perhaps the most striking feature is the character of the secretion of the glands of the gastric mucosa. This irritating, eroding acid fluid must be a factor in the development of the chronic ulceration, at least, if not in its inception. Inasmuch as the mucous membrane of this part of the tract is constantly exposed to this fluid, but is not affected by it under ordinary circumstances, it is likely that trauma or infection occurs to produce a break in the epithelium before the juices have any effect on the tissues. Hyperacidity, caused by functional disturbance in the stomach, even though it existed for a long time, would not result in ulceration unless accompanied by another factor. Patients with very high percentage of acid in the gastric juices are not more prone to this ulceration. Trauma to the lining of the stomach, resulting from indiscreet choice of diet and improperly masticated food, has been assigned as an etiologic factor in the formation of these lesions, and while this must be taken into consideration, it is nevertheless evident that trauma is not essential to the formation of ulcers. We have sufficient evidence to prove that a peptic ulcer may form and progress during the time that a strict dietary regime is being carried out and when there is no possible chance of trauma. In performing secondary operations on such patients, we have on several occasions found new ulcers, and old ones which had evidently greatly increased in size. These secondary ulcerations have been found in certain cases in which a gastro-enterostomy had been performed, and in spite of the fact that the anastomosis apparently functioned well. New ulcers have also been found in patients who, between the first and second operation, were under strict medical regime. It is of course possible that, through error, these ulcers were overlooked at the time of the first operation, but in several instances in which the entire surface of the stomach and duodenum was carefully searched a lesion was not detected, yet the definite and easily recognized ulceration was found at the second operation. I am convinced that ulcers may form and develop in certain individuals in spite of precautions, and that the ordinary medical regime and gastro-enterostomy which cure so many patients will not prevent new ulcers from forming in all cases. I believe that some persons have an idiosyncrasy for ulcer formation, because, in some cases observed, ulcers continued to develop, regardless of treatment. Fortunately, such patients are few. It seems quite probable that it is this type of ulcer which has led certain surgeons, especially in Europe, to advocate radical operations for ulcer of the stomach and duodenum. In view of the fact that the less radical procedures have been so satisfactory in most cases in the Clinic, we have been slow to adopt the more radical. Detailed investigations have been made of those patients with a tendency to ulcer formation in an endeavor to establish a definite factor as the cause, but thus far no special characteristics have been noted. Infection undoubtedly plays some part in the formation of ulcers, but it is difficult to explain just why the bacteria select the tissues of the stomach and duodenum in particular, unless the organisms have a selective activity, or unless the vessels in this portion of the stomach are end-vessels and do not anastomose, so that there is no escape for the bacteria if they once enter the vessels. The presence of these end-vessels would seem to offer a favorable condition for embolism and thrombosis. I do not

*Read before the St. Paul Clinic Week Meeting, January 10, 1923.

believe, however, that the vessels in the upper third of the duodenum are end-vessels; hence this theory would not apply and the type of circulation is probably not a factor.

Acute hemorrhagic ulcers have been produced experimentally in the stomach and duodenum in several ways, but especially by introducing organisms into the circulation. The same result has been accomplished by feeding certain substances by mouth, but ulcers have not been produced which resemble the chronic lesion seen clinically in man. The experimental ulcers are small multiple lesions and heal promptly of their own accord. There is a certain group of cases of acutely bleeding ulcers which are not considered surgical. These patients, having had little, if any, indication of ulcer previously, usually have sudden, severe hemorrhage from the stomach. Two or three hemorrhages may occur within a few days. A number of years ago several such patients were operated on in the Clinic to stop the bleeding, but usually what appeared to be a normal stomach and duodenum was found, with no sign of ulceration. In some instances the stomach was opened, but the ulcer was not found, even though the stomach was full of blood clots. Undoubtedly ulcers were present in these cases, although they were too small to be discerned. In view of this experience, it is now believed that many of these patients suffer from small hemorrhagic ulcers, possibly very similar to those produced experimentally in animals by infecting the blood stream. With this in mind, we have recently treated acute hemorrhagic cases by clearing up all foci of infection and by general measures, and have not operated for the ulcers. If the hemorrhages are repeated or if there are other evidences of ulcer, it may then be well to operate. Supporting the theory that the acid chyme is a factor in the cause of the ulceration, especially with lesions developing in the intestine after gastro-enterostomy, Mann has recently carried out a series of experiments in which he allowed the unchanged gastric juices to flow into the small intestine at some distance below the duodenum; in many of these animals ulcers formed. The fact remains that in spite of experiments and investigations and the accumulated experience of clinicians and surgeons, we are unable to explain the cause of chronic ulcer.

CHARACTERISTIC FEATURES OF ULCERS

Chronic gastric ulcer more often occurs as a single lesion, although there may be one large and a number of small ulcers. Usually the ulcer has a deep crater and much surrounding induration. Occasionally it is superficial, although the mucous membrane is always eroded. The ulceration extends through all the coats of the stomach, and on the peritoneal surface is often sealed by attached fat tags. In most cases, the ulceration extends through and involves the peritoneum, although in only a few are there signs of actual perforation. Nearly all gastric ulcers occur at approximately the same location, on the posterior wall of the stomach just off from the lesser curvature in the middle section of the stomach. Sometimes they are found on the posterior wall near the cardia, and occasionally near the pylorus, but very rarely on the anterior surface of the stomach. The so-called pyloric ulcer is much less common than has been thought. The physical characteristics are those of true ulcer; it is very hard, has a deep crater and an irregular, firm edge. Whether some of these lesions begin as simple ulcers and later become cancers, or whether they represent a type of slowly developing malignancy, is difficult to determine. The clinical history, gastric tests and roentgen-ray examination show that the lesion is either one or the other, but at times the distinction cannot be made even by sight and palpation. Often a detailed microscopic examination is necessary in order to settle the diagnosis. All of us who treat such cases should keep in mind the possibility of malignancy, and if we treat the lesions by any method except removal of the ulcer, we must take the responsibility of carrying an operable case into a less favorable and possibly hopeless condition.

Although the clinical features of gastric and duodenal ulcers are much alike, nevertheless there are many features in which they differ widely. Duodenal ulcers are often multiple; usually one occurs on the anterior surface and one opposite on the pancreatic side. Most duodenal ulcers are on the anterior surface within 2 cm. of the pylorus and nearer the upper than the lower border. This results in the characteristic deformity, a stellate contracting scar which draws down the upper border. It is sometimes difficult to demonstrate the presence of an ulcer on the posterior wall. It is usually some distance below the pylorus and does not cause any apparent change in the appearance of the duodenum, but usually can be felt as a distinct crater ulcer.

I am convinced that lesions of the duodenum are of two distinct types. In one, the lesion is a true ulcer with a crater and with destruction of the mucous membrane and induration of the surrounding tissues. This can be readily picked up and felt as a crater ulcer. In the second type, the characteristic feature is a localized inflammation. The tissues around the ulcer are edematous and congested. Sometimes the edema and swelling are sufficient to change the tissues so that thickening can be felt in the wall of the duodenum. At other times no lesion is felt as the duodenum is lifted, but a localized stippling results from handling the area. When this tissue is excised, it shows all the signs of inflammation, but the mucous membrane surface is intact and necrosis is not encountered as in true ulcer. Some of the areas of inflammation undoubtedly have small spots of ulceration in the mucous membrane, but in others these cannot be demonstrated. So far as we have been able to determine, there is no clinical difference between ulcer and local inflammation, but neither of these conditions is a stage of the other. The area of inflammation produces the same deformity to the duodenal cap that the ulcer produces, but in these cases the roentgenogram does not reveal a niche as it sometimes does in cases of ulcer. Since excision of the ulcer has become more common, the tissues removed have been studied with special interest. In some cases the inflammation seemed to extend around the entire circumference of the duodenum and cause constriction; in others so little of the wall of the duodenum was involved that it did not seem that this could be responsible for the symptoms, and yet the patients obtained relief when this area was excised. In dealing with ulcer and areas of inflammation in the duodenum, one can almost disregard the question of malignancy. Primary carcinoma of the duodenum, which in any way resembles ulcer, occurs so seldom that it is not necessary to consider it in the treatment of these conditions.

CLINICAL FEATURES

The clinical symptoms of ulcer of the duodenum are usually clear-cut and definite; generally a diagnosis can be made with a degree of certainty from the history. This is not always true of ulcer of the stomach. The dyspepsia resulting from the gastric ulcer is more continuous and the pain may or may not have such a definite relationship to food. In general, however, it may be said that in most cases a diagnosis of ulcer of the stomach or duodenum may be made from the clinical history. There is some question as to the value of the chemical analysis of the gastric content and the knowledge gained from the motor meal in making a diagnosis. During the war Moynihan was obliged to dispense with his laboratory for such examinations, and later he was of the opinion that this had not changed to any appreciable degree the accuracy of diagnosis in gastric disorders. Yet considerable information may sometimes be gained from such examinations, and probably information which could be obtained in no other way, but too much importance should not be placed on them in differentiating ulcer and cancer. The roentgen-ray has gradually become the most important factor in making such diagnoses. The examinations, however, must be made and interpreted by an expert or the readings are likely to be misleading. It requires a great deal of study and experience to obtain the knowledge that is necessary to make an accurate roentgen-ray diagnosis.

The clinical course of a case of ulcer is characteristic. Generally, in the beginning of the trouble the symptoms are present in the spring and fall, with complete remission during the summer and winter. It is difficult to understand how the ulcer which must be present all of the time can cause so much trouble during two seasons of the year and be inactive during the others. It is not unusual for the symptoms to continue in spite of rigid treatment during the active season and then to disappear regardless of indiscretions.

TREATMENT

Some of the most conclusive evidence in support of the value of the medical treatment of ulcer comes from necropsy records. We are constantly seeing more of the so-called healed ulcers of the duodenum in cases in which there was no clinical evidence of an ulcer during life. This would seem to prove that the ulcers are not only common, but that spontaneous healing often occurs. There is no question but that a great deal of good can be done by medical treatment. In many cases the symptoms disappear almost as soon as treatment is instituted, and in some the symptoms do not reappear when treatment is dispensed with. Undoubtedly the ulcer has been healed by neutralization of the contents of the stomach. In certain cases, as soon as the

regime is discontinued and the patient returns to his normal diet, there is recurrence of the symptoms. This should be an indication for operation. Whether medical or surgical treatment is to be instituted in the beginning will be dependent on several factors. An ulcer causing obstruction, or a chronic, bleeding ulcer, is sufficient indication for operation. Generally, if the ulcer is in the stomach, operation is advisable. Experience convinces me that the change seen in roentgenograms a few days or weeks after institution of medical treatment is not due to healing of the ulcer. The ulcer has always been present in the several cases in which I have operated under such circumstances. Any patient with duodenal ulcer who is not doing well under medical management should be operated on.

The surgical management of an ulcer of the stomach should always include removal of the ulcer. If the ulcer is small, it should be excised and a gastro-enterostomy performed. It is necessary to perform a gastro-enterostomy in excising gastric ulcers in order to maintain proper peristalsis in the stomach. Complete inability of the stomach to empty may result from excision of an ulcer from the lesser curvature, even when the ulcer is at some distance from the pylorus. I have observed this in several instances. If the ulcer is large, and especially if it has a posterior attachment, as is often the case, I believe that it is best to perform a sleeve-resection, taking a part of the greater curvature, even though it is not involved. This will maintain normal peristalsis and gastro-enterostomy will not be necessary. I believe that this type of operation will be employed more often in the future, for gastric ulcer. If the ulcer is near the pylorus it is often best to perform a pylorectomy, to complete the anastomosis by end-to-end suture or by closing the ends, and to perform a gastro-enterostomy. The principle in the surgical treatment of gastric ulcer is to remove completely the ulcerated area and to establish the gastro-intestinal tract as simply as possible. A gastro-enterostomy alone in these cases leaves the possibility of malignancy, and furthermore, one-third of the patients will not be relieved by gastro-enterostomy.

The surgical treatment of duodenal ulcer is somewhat different from that of gastric ulcer. In the first place, it is not necessary to consider the possibility of present or future malignancy. If the ulcer is in the free portion of the duodenum so that a technically accurate excision can be made, the operation of choice is complete removal of the ulcer and restoration of the duodenum. This is a simple and safe procedure. In excising a duodenal ulcer it is not necessary to perform a gastro-enterostomy. If the stomach is large with a tendency to spasm, then not only is the ulcer excised, but the sphincter at the pylorus divided, in order to enlarge the pylorus and overcome the spasm. If the duodenum is not free and cannot be mobilized so that the ulcer may be accurately excised, a gastro-enterostomy alone should be performed.

Few operations have given better results than gastro-enterostomy and its use should be continued in many cases. Before performing a gastro-enterostomy it is essential to determine positively that an ulcer is the cause of the trouble. If operation is performed, accurate technic in suturing the mucous membrane of the stomach and intestine should be employed. There is no operation in which accurate technic is more essential. A few patients may secure unsatisfactory results in spite of all care, but most of them will be completely and permanently relieved.

DYSMENORRHEA*

J. L. Rothrock, M.D.
St. Paul

Of the many diseases to which women are subject by reason of sex, perhaps none is so common, and at the same time so little understood, as dysmenorrhea. The repeated monthly occurrence of menstruation and the profound symptoms which characterize dysmenorrhea often being of such severity as to incapacitate young women and girls for one or more days, renders it a subject well worthy of our most serious consideration.

In selecting this subject, I wish to say in advance that I have no new theory to propose, no nostrum to exploit, nor panacea to recommend, but wish rather to briefly review the literature on the engaging subject, for it is profitable to occasionally take stock of our knowledge in order to maintain a proper perspective.

Dysmenorrhea, according to the modern conception of the term, signifies not only the colic-like

*Presented before the annual meeting of the Minnesota State Medical Association, Minneapolis, October, 1922.

pains which accompany the menstrual flow, but, in its broader sense, includes all those disturbances of function which accompany and which go to make up the symptom-complex of pathological menstruation. Dysmenorrhea is therefore, in a strict sense, not a disease, a distinct pathological entity, but is a term used to designate a group of symptoms, the predominating feature of which is pain accompanying menstruation. Since it occurs in patients with very definite pelvic pathology, as well as in those whose pelvic organs, so far as it is possible to ascertain, are perfectly normal, it is evident that there are probably many causes, widely different, and in some instances difficult to determine. It is the purpose at this time to consider especially that form which occurs in the absence of any definite gross pathological disease of the pelvic organs, and it may be said that this type constitutes by far the larger proportion of cases. This form has been variously termed by different authors as idiopathic, essential, or functional dysmenorrhea.

As to frequency it has been variously estimated as occurring in from 50 to 80 per cent of all young women. Personal observation leads me to believe that it has greatly increased in frequency within recent years, and it is probable that the stress of modern life in our cities, with the many and strenuous activities in which young women engage, are responsible for the increase. In confirmation of this view, Menge in a recent paper notes a great increase in Germany, during and since the war, which he attributes to the great change in the social status of many young women and girls of formerly well-to-do families, who through the vicissitudes of war have been obliged to go to work to support themselves.

It appears with the first menstruation, or it may appear some years later. In many instances it is relieved after the first childbirth, but I have recently observed instances of women who suffered severely from menstrual pain who had given birth to at least one or more children, and in whom the most painstaking examination failed to disclose any pelvic pathology. Some of these patients stated that they had never before suffered from painful menstruation.

Many theories have been proposed, the oldest of which, and perhaps the most commonly accepted, is the mechanical theory. The pioneer of gynecology in America, Marion Sims, was an ardent supporter of the theory and it was he who gave expression to the dictum "no dysmenorrhea without obstruction." According to this theory the pain was explained by the mechanical obstruction to the outflow of blood, either from narrowing of the cervical canal from anatomical peculiarities as congenital stenosis, or from sharp flexions producing angulation. While the mechanical theory was long predominant, and still has supporters, observation has shown numerous instances of high grade mechanical obstruction without dysmenorrhea. In addition, observation shows that in only a small percentage of cases can true obstruction be demonstrated.

With the introduction of pathological histology, studies of the endometrium showed changes which were interpreted as types of inflammation and for the following two or three decades endometritis came to play a very important rôle as an etiological factor in dysmenorrhea. More recently the epoch-making discovery of Hitschmann and Adler, who pointed out that the familiar pictures representing the various forms of endometritis were nothing more than cyclical changes in the normal endometrium which occur during the month, has so discredited that theory that it is now applied to but one form, the so-called membranous dysmenorrhea, and even here an inflammatory basis, according to recent investigation, is not well founded.

Hypoplasia of the uterus has long been observed to be frequently present in dysmenorrhea, and the cause was thought to be due to the inelasticity of the undeveloped uterus, causing painful contractions (Victor Schultz). Stolper, however, calls attention to the fact that dysmenorrhea is not always a symptom in patients with hypoplasia. It may be said that in comparison with the total number of patients who suffer from dysmenorrhea those with hypoplasia constitute only a small minority, and from personal observation I have found that patients with hypoplasia more frequently seek relief for amenorrhea and sterility.

Theilhaber rejects the mechanical and other theories and attributes the pain to spastic contraction of the circular fibres of the internal os, in individuals with a predisposition to abnormal nervous irritability, and, by the way of analogy, cites spasm of the pylorus.

Menge, in 1901, proposed a new theory of dysmenorrhea as follows: The uterus is in a constant state of rhythmic contraction which in physically sound individuals is painless and unnoticed, but

which in the presence of pathological changes in the genital organs, or of functional disturbances of the nervous system, become painful. Menge would therefore place all cases of dysmenorrhea on a nervous basis. In a recent article in the Centralblatt für Gynakologie, it is interesting to note that he reiterates his former view as to the conception of dysmenorrhea, namely that the pain is due to the over-receptiveness of the central nervous system, so that a very weak stimulus may call forth a painful response.

Vedeler, also, long ago expressed the opinion that dysmenorrhea was of nervous origin, and was a stigma of hysteria. Kroenig, while he would not go so far as to class every woman with dysmenorrhea as hysterical or neurasthenic, believes that in a great majority of cases there is at least a nervous predisposition. Kroenig further calls to mind the frequent coincidence of dysmenorrhea with other nervous disturbances, such as hyperesthesia, hyperalgesia and vasomotor and trophic disturbances in the genital sphere which are usually recognized as symptoms of functional nervous disease, especially hysteria and neurasthenia.

Since dysmenorrhea in its narrowed sense has for its predominating symptom pain varying from a pathological increase in the uterine contraction to pronounced spasm, from the evidence at hand an over-receptiveness of the nervous system to slight stimuli appeals to the imagination as being very plausible. Obstetricians have long recognized this phenomenon in the pregnant uterus. There is a wide range of difference in the response of the uterus to the stimulus of labor, from the almost incessant pains which occur in some individuals, to the extremely slow and sluggish response in some mothers. This same phenomenon is observed in the puerperium, manifesting itself in the so-called after-pains, and it has always seemed to me that these painful contractions of the uterus have much in common with the pain of menstruation and are probably due to the same causes.

In recent years much attention has been given to a study of the nervous mechanism of pain in menstruation. The nerve supply of the uterus is from the sympathetic and the pelvic portion of the vagus (the autonomous nervus pelvicus). The pain has been explained on the theory of vagus irritation ("Vagitonie"—Eppinger and Hesz). In substantiation of this theory, Novak observes that the same patients who during pregnancy suffered from arrhythmia, and tachycardia or bradycardia, invariably gave histories of having had dysmenorrhea.

Mathes calls attention to the frequency with which congenitally asthenic individuals, usually that type of women with hypoplasia of the genital organs, suffer from asthenia of the cerebral cortex and abdominal sympathetic.

The most recent theory to engage attention is the internal secretory theory. This theory would explain the symptoms as being the result of functional disturbance of the ductless glands. Naturally interest centers in the ovary, since it is now quite well established that menstruation is dependent upon hormones eleborated by the corpus luteum. Slight deviations from normal due to functional disturbance may result in a change in the quantity of the hormone elaborated, this giving rise to a hyper- or hypofunction with consequent varying phenomena. In the light of present knowledge of the rôle played by the internal secretions, we must take into consideration not only the ovary but other ductless glands as well, remembering that certain of them are antagonistic while others are synergic, and that in health a delicate balance is maintained between them. No other theory so well explains all the phenomena attending menstruation, especially the reactions in other organs of the body often far remote from the pelvic organs. It also furnishes an explanation of the associated nervous phenomena which accompany menstruation, and the trend of opinion today is toward the view that the so-called fuctional nervous diseases are in many instances due to disturbances in the balance of the internal secretions, with consequent disturbances of metabolism.

The treatment of dysmenorrhea is both medical and surgical. The surgical treatment consists in operations for the relief of definite pathological lesions of the pelvic organs acting on the mechanical theory. Sims practiced incision of the cervix and devised the operation which bears his name. Later, dilatation of the cervical canal became the popular mode of procedure. This was accomplished by graduated bougies after the method of Hegar, or the mechanical dilators, the best known example being those of Ellinger or Goodell or their modifications.

With the coming into prominence of endometritis as an etiological factor, curettage was added to dilatation of the cervix and this treatment came

to be the accepted routine for all cases and is still practiced with modifications. The introduction of stem pessaries after dilation, to be retained for some time, has been a favorite method with some clinicians and has given alleged good results. In obstinate cases, as a last resort oophorectomy has been performed occasionally in the past, but in the absence of definite pathological changes in the ovary, such as chronic ovaritis with cystic degeneration, it can scarcely be considered justifiable.

Medical treatment has consisted of the administration of drugs to allay nervous irritation, such as bromides, and tonics to improve the general health; for the relief of pain, antispasmodics and analgesics at the menstrual periods. Some years ago Fliesz described a method of treatment which in his hands proved successful, which consisted of cocainizing the so-called genital spots in the nose. These consist of localized areas over the inferior turbinated bones which become much swollen and congested during the menstrual periods.

All methods of treatment have up to the present been disappointing. According to available statistics from various sources, surgical measures have given relief in not more than 60 to 70 per cent of cases. Menge, in a recent paper, claims 80 per cent of permanent cures by a method consisting of wide dilation of the entire uterine cavity with Hegar's dilators, carrying the dilation up to No. 16. He then with a specially devised metrotome makes multiple incisions in the cervical canal, after which he packs the uterine cavity with oil-saturated xeroform gauze. The gauze is allowed to remain in the uterine cavity for eight or 10 days.

In recent years, attempts have been made to devise a rational scientific therapy based on our knowledge of the nervous mechanism of the pain. To counteract stimulation of the vagus nerve, atropin at once suggests itself and has been extensively employed with alleged good results. More recently benzyl benzoate has come into use based on its physiological action.

In 1915, Block, in order to arrive at a rational method of therapy, classified dysmenorrhea into three main types: (1) obstructive, (2) ovarian, (3) vagotonic. (1) The obstructive type is characterized by premenstrual uterine colic, scant flow for one or two days, with the pain decreasing as the flow becomes profuse. The cause is obstruction in the cervical canal, against which treatment should be directed. (2) The ovarian type is characterized by symptoms of bilateral ovarian pain synchronous with the appearance of the flow, premenstrual headache, epistaxis, nausea and vomiting, uterine cramps after the flow is established. The cause is increased ovarian secretion. The treatment recommended is intranasal, by cocainizing the genital spots in the nose after the suggestion of Fliesz, or hypodermic injections of adrenalin. (3) The vagotonic type is characterized by severe cramps in the lower abdomen and other symptoms suggestive of the obstructive type. The cause is increased irritability of the vagus. The treatment recommended by Block consists of large doses of atropin beginning a day or two before the expected period.

Ever since Block published his paper, I have attempted to differentiate the three types he describes and have usually found it possible to recognize them with some slight variations. The most difficult to differentiate is the vagotonic type. For this type Stolper states that if the blood pressure is elevated atropin fails to relieve, the explanation of which he does not state.

Block's ovarian type corresponds in the name with what has long been recognized and termed the congestive type. For this type, following the recommendation of Olshausen, I have been accustomed to prescribe a mixture of fluid extract of hydrastis and ergot, in the proportion of 20 minims of the former to 40 of the latter, three times daily, beginning about a week before the expected period and continuing up to and during the first day of the period. Stypticin may be substituted for the hydrastis and seems to give similar results.

Of other drugs that have been suggested perhaps the latest claimant is uzara. According to the experiments of Gürber and Hirz uzara stimulates the inhibitory fibres of the splanchnic while atropin paralyzes the antagonistic nerve endings of the autonomous system. J. Novak recommeds the combination of the two drugs in severe cases.

Organotheraphy has, of course, been extensively employed and, according to reports, with varying results. It may be said of organotherapy in the treatment of dysmenorrhea, as in other diseases for which it has been recommended, that with a few exceptions it has proved disappointing and that until we have a more accurate knowledge of the cause of dysmenorrhea and the manner in which those causes operate it will be impossible to apply organotherapy in a rational manner. It may be said, however, that up to the present no other theory

so well explains the phenomena of dysmenorrhea or is so encouraging in the promise of a remedy for its relief.

REFERENCES

Hitschmann and Adler: Die Lehre von der Endometritis. Zeitschrift f. Geb. u. Gyn. Bd. 60, 1907.

Kroenig: Ueber die Bedeutung der functionellen Nervenkrankheiten für die Diagnostik und Therapie in der Gynakologie.

Menge: Zur Therapie der Dysmenorrhoe. Zentralblatt für Gynäkologie S. 1330, 1922.

Fliesz: Die Beziehungen Zwischen Nase und den Weiblichen Geschlecht Organe, 1897.

Eppinger and Hesz: Zur Pathologie des Vegetative Nervensystem. Zeitschrift f. Klin. Med. Bd., 67.

Grüber: Ueber Uzara. Münch. Med. Wochenschrift 1911, Wr., 40.

Block: Some observations on the treatment of dysmenorrhea. American Journal of Obstetrics, Dec., 1915.

DISCUSSION

Dr. Jennings C. Litzenberg, Minneapolis: I presume I was invited to discuss this paper on account of my experimental work in connection with the use of benzoate in the treatment of dysmenorrhea.

Dr. Rothrock has carefully and completely reviewed the etiological theories of dysmenorrhea. As long as we do not know the cause of any disease, the treatment is bound to be empirical, and the results more or less unreliable.

In the class of cases Dr. Rothrock mentioned, as the idiopathic, sometimes called the spastic type of dysmenorrhea, antispasmodics are applicable. I had obtained results with the use of atropin; therefore, when Mock, of the Johns Hopkins, theoretically advanced the idea that the benzoate radicle of benzyl benzoate was identical with the other antispasmodics, and, being non-toxic, he advocated its use in various conditions, it stimulated me to make some clinical experiments. Dr. Hirschfelder at the same time made some pharmacological experiments with the drug as to whether it was an antispasmodic or not, and his experiments showed that it was.

I have sometimes been referred to as the advocate of benzyl benzoate. I am not an advocate but only an experimenter. My results given in the first paper I read were something like 60 per cent of relief. These results must be taken with a grain of salt because the nervous element comes in here. It is palpably impossible to believe that a woman can be cured of dysmenorrhea lasting over many years by one dose of benzyl benzoate, as one of my patients claimed to be. One dose of 20 per cent emulsion benzyl benzoate apparently cured her dysmenorrhea. She is one of the hysterical type of cases, and I do not give the drug credit for the cure, although it was the most brilliant result we have had. It is only an antispasmodic and cannot be a cure. We must take all these things with a grain of salt.

Dr. Stacey, of Rochester, has used the same methods that I have. The essential part of my method was the discovery that the usual small dose of benzyl benzoate was absolutely useless. In spite of the fact that several drug houses have, without my consent, stated that I had obtained results with five grains of benzyl benzoate, there is no truth in such a fantastic statement. With anything less than two teaspoonfuls of a 20 per cent solution one cannot get any results.

I wish to take this opportunity to make a thrust at those drug houses who accept anything new. If we suggest that any drug may be of some value, they exploit it, advertise it, and take it around to all the doctors and say Dr. So-and-So has obtained splendid results with it. I have filed my protest against the statement of a certain firm. I have stated that five grains was a waste of time. I do not know whether benzyl benzoate is of any use or not. My results so far have been over 60 per cent relief, and Dr. Stacey got 50 per cent or more favorable results in the spastic type of dysmenorrhea. The real value of benzyl benzoate and similar drugs is still in doubt.

Dr. William A. Coventry, Duluth: I divide cases of dysmenorrhea into two classes, obstructive and congestive. With the obstructive type we usually find a deformity, such as an acute antiflexion of the cervix, and these cases are treated with the supposed idea that there is obstruction, usually at the internal os. In these cases, if you care to, you may attempt to pass a probe up into the uterus. The question arises whether at the time of menstruation the uterus is congested, so that there is a true obstruction at the cervix. In the congestive type I like to look for some cause outside of the uterus and usually find it.

I have been through the organo-therapy line of treatment, atropin and benzol benzoate and the operative treatment. With organo-therapy I have tried all internal secretions with only fair success. With benzol benzoate I have tried small and large doses and have obtained results in 25 per cent of the cases, usually those only of the obstructive type. The congestive type of cases generally call for operative procedure when we find some condition outside of the uterus causing trouble. Operative procedure for the obstructive type in my hands is only successful for a short time. I have tried all the different methods of dilatation in the office, dilatation under anesthesia and the insertion of stem pessaries, and have allowed them to remain from six weeks to two months, and I find I get distinct results when the pessary remains for some period of time in the cervix. These patients are informed that if they are operated on, it is only done on trial, and that if results are obtained they are only good for six months to a year. If you make this proposition to these patients before you start in, you will not operate as many as you did before you made this assertion.

Dr. J. L. Rothrock, St. Paul (closing): Owing to the very large scope of this subject, I will only touch briefly on the question of treatment. I want to say, I followed out Block's classification that I have mentioned and have found it successful. It is published in the American Journal of Obstetrics and Diseases of Women for December, 1915. It seems, if we are going to treat these cases successfully, we ought to try and classify them, and I have found, by following the classification mentioned, that, while there is some overlapping, we can definitely recognize these types. The type which the author of the classification calls ovarian is the type regarded by others as the congestive type. Long ago Olshausen recommended giving in these cases a combination of hydrastis and ergot, beginning about a week before

menstruation. That is quite successful in a number of cases with the idea of relieving over-congestion of the pelvic organs. He recommended 20 drops of the fluid extract of hydrastis, and 40 drops of the fluid extract of ergot, three times a day, beginning a week before menstruation and continuing until the flow is well established. Owing to the difficulty of obtaining hydrastis, I have substituted stypticin and have used it in combination with ergot with about the same results. In some cases we have failed to get results.

One thing more I wish to mention. We often get relief for one or two menstrual periods with almost any new remedy and then it fails to have any effect. I believe the explanation of this is to be attributed to suggestive therapeutics rather than to any merit which the remedy may possess.

I have found it difficult to follow up these patients for they become easily discouraged and pass into other hands seeking for relief. On that account I am unable to give details as to what the results of treatment have been.

MENTAL ASPECTS IN DELINQUENCY*

JOSEPH C. MICHAEL, M.D.
Minneapolis

Twentieth century medicine has made the notable achievement of applying itself more and more effectively to disease in its very early stages of development as well as to the phases of prevention. This situation is becoming gradually more and more evident in the field of neuro-psychiatry.

It is quite fitting that an organization of social service workers give evidence of an interest in the subject of delinquency as you are doing. Social service makes possible more effective preventive medicine and hygiene. This is emphatically the case in mental disease and defect.

Delinquency, or abnormal conduct, we have come to regard as not a mere isolated or fortuitous circumstance, but rather an integrated individual type reaction with determinable psychological antecedents, evolving in accordance with fairly definite biological laws.

Now, inasmuch as the subject of delinquency is to be discussed today under two separate headings, one as to mental and the other as to physical aspects, I want to warn against the possible misconception of a dual grouping of distinctive types of etiological mechanisms, as "physical" and "mental" in the production of conduct disorder. The former tendency to regard psychopathic conditions as being purely mental is no doubt accountable for this conception of dualism in etiology. While we are able to demonstrate mental disorder in a large proportion of delinquents, such so-called mental disorder is nevertheless a reaction of the entire individual. One expects, of course, to find a great variation in the degree of the reducing factors by disease or influences from environmental conditions.

We might as well frankly admit that the problems of delinquency have been relatively neglected; certainly well organized efforts to cope with them can hardly be said to exist throughout the country, even at the present time. The importance and magnitude of this situation become evident when we contemplate the recent United States census figures, which show that annually about half a million individuals are admitted to penal and correctional institutions in our country. Great sums of money are of course required to provide the maintenance for all these offenders. Approximately $2,500,000 is spent daily to apprehend, convict, sustain and discharge criminals. In New York it has been estimated that it costs $30,000 to convict a criminal. About two-thirds of the institutional inmates are repeated offenders. The economic phases necessarily loom before us as most important for earnest consideration.

It will of course be quite impossible to attempt a comprehensive discussion this morning. My aim will be rather to indicate to you the prevalence of mental disease and defect among delinquents by referring to typical studies made of groups of adult criminals, prostitutes and youthful offenders, as well as to discuss the principles of prevention; and also to show the need of an appreciation by the social service worker of the importance of psychiatric principles and measures and the part she can perform in their application.

Dr. Bernard Glueck made a psychiatric study of a series of 600 cases of criminality at Sing Sing, New York, in 1917. Of these, 12 per cent were found to be insane; 28 per cent were intellectually defective, and 19 per cent gave evidence of having had an inherent psychopathic make-up. In the remaining 41 per cent habitually bad behavior was frequently found to have characterized the offender's past life history while no defect in personality make-up was demonstrable. We may feel quite safe in presuming that mental conflict and maladjustment resulting in impelling ideas and com-

*Read in part before the Minnesota State Conference on Social Work, Glenwood, September 11, 1922.

pulsive acts in the wrong direction at the time of youth or adolescence, occasioned the beginning of bad behavior in many of these cases.

In 1919 Dr. Weldon of the United States Public Health Service made a survey of one hundred prostitutes, all inmates of a detention home in Louisville, Kentucky. Only seven of this group of offenders were determined to be normal; 38 per cent were feeble-minded, ranging in mental ages from 7 to 9.6 years; 43 per cent were determined to have a psychopathic make-up; one woman suffered from an active psychotic disorder, and three were epileptic. The seven classified as normal were all found to have had a very poor early home environment. Weldon gives the figures of 300,000 as representing the total group of this class now living in our country.

During the past three months, the writer studied a series of eleven cases of delinquency at the Boston Psychopathic Hospital. Two were without mental disease or defect or physical disability; four were psychotic; two had psychasthenic types of reaction; one had an inherent psychopathic make-up; one was mentally defective; and the last case had congenital syphilis. All of these women were sex offenders. Three were also alcoholics, and another was a forger; she lied and stole since the age of nine.

This latter case, C. W., illustrates the problem of serious delinquency in an adolescent:

Patient was a woman aged 24, of Russian Jewish parentage. She was brought to the Psychopathic Hospital by order of the Court for mental observation. She had just been apprehended in Maine two weeks after running away from home with a worthless chap who had a criminal record and with whom she professed to be very much in love. Our study revealed that commencing at the age of nine she began stealing at home and had continued that ever since. At the age of nineteen she forged a number of checks on her parents. At that time she very actively influenced a soldier, by many misrepresentations, to marry her, but she was divorced a year later. Home conditions revealed unusual indulgences toward her on the part of her parents and brothers and sisters, excepting that parents would not allow her to have company at home. She was her mother's pet and the mother always resisted even minor controlling or punitive measures. From the age of four to ten or eleven she suffered from nose-bleed frequently, for which she received unusual sympathy from her family. Several of her brothers and sisters held high educational positions. Excepting that one had been in a state hospital for a year and a half, family history revealed no history of unusual disease. Patient herself was physically entirely negative; neither was there any mental aberration. Psychometric test revealed a higher than average grade. Association studies gave evidences of her preoccupation with her recent complications only. And in these respects reaction time was moderately delayed.

Here then we have the not uncommon individual with an inherently unstable make-up, a moral delinquent, a psychopathic inferior, who herself says she knows these acts of hers are wrong; indeed, she cries and is sorry for her family because of them but she just can't help doing these anti-social deeds. How are we to regard a case such as this one? To ascribe her instability to bad heredity helps us little. Many families of poorer endowments produce less serious or no offenders. It is true that even some of these so apparently hopeless cases, if given more study from the very early (infancy and childhood) environmental standpoint, lead one to believe that promising results might have been obtained if active measures had been applied when delinquent conduct was first noted. If Clara could have been observed and treated at the ages of five to ten, who can say that her career might not have been entirely otherwise?

Healy and Bronner, in 1916, reported their observations in 2,000 cases of juvenile offenders. Their mental classifications show approximately 10.5 per cent to have been feeble-minded and 7.5 per cent as subnormal mentally; 5.5 per cent were dull mentally from physical causes. About 5.6 per cent of their cases suffered from an active psychosis, and 2 per cent were constitutionally inferior. Epilepsy was present in 7 per cent of their first 1,000 cases whose after-careers were carefully gone over. Mental conflict was determined by them in about 7.5 per cent of all the cases, and adolescent instabilities and impulses averaged 11.5 per cent.

Sanger Brown II, in 1919, studied 200 grade school boys, all having behavior disorders. Disturbed sleep was found as a frequent nervous disturbance, and these children were noted to exhibit a poor emotional control. Irritability was found to have been a character trait in all these. Other varying neurotic complaints were often present. The mentally defective group was much smaller than that of the nervous, the more poorly adjusted and unstable group.

In May of this year the National Committee for Mental Hygiene completed a survey in the city of Cincinnati. One hundred and fifty-seven juvenile court cases were examined in detail. Thirty-six per cent of these youths were repeated offenders. An inherent character defect or unstable mental make-up, in other words a psycho-

pathic personality, was determined in 49.2 per cent of the repeated offenders, and in 21 per cent of the first offenders. Only 3.1 per cent were classified as mentally defective and 63 per cent had an intelligence quotient of over 80. A psychopathic personality is consequently more important for consideration than feeble-mindedness. Mental conflicts, mental maladjustments and other nervous abnormalities were present in 37 per cent more of the first offenders, and in 42.8 per cent additional cases of the repeated offenders.

Impairment in physical health, such as enlarged thyroid, heart conditions, diseased tonsils and adenoids, defective teeth, defective vision, defective speech, anemia, etc., was found in varying degrees in all but 20 per cent of the 157 cases.

The Healy and Bronner statistics show almost 60 per cent of their cases of youthful offenders as coming under some classification of a mental disease. Add hereto the percentage of defects of bodily systems not found in the normal groups, then you have a vivid illustration of the importance of the medical problem involved. In some cases the constellation of "physical" and "mental" factors becomes difficult to resolve itself. The following is a case in point:

E. H. (No. 37424) was recently admitted to the outpatient department of the University Hospital. Patient was a boy of thirteen. Mother complained that she could do nothing with him, that for the past five years he has constantly been found to steal and to tell lies so that she could not depend on him at all. He was incorrigible; did not play with other boys, had no childhood friends and remained by himself most of the time. Took no interest in the usual boyhood sports. In school he had to be placed in a special class. Teachers reported that he was very easily fatigued, that he was very disobedient, very irritable, in fact quite unmanageable as they regarded him. On examination we found upper incisor and canine teeth peg shaped; chronic rhinitis; enlarged cervical glands. His mother gave us the history that the father had three brothers who were all confined in state institutions because of mental diseases. Also that the father died of paralysis and that he had contracted syphilis about a year and a half prior to the boy's birth. Mother noted that the patient had "sores" when he was born. Psychometric test recently reported gave a mental age of ten years and nine months, I Q of 81, not subnormal.

The problems presented in this case have to be met from many angles: psychiatric, serological treatment for congenital syphilis, home situation, school training, etc.

Environmental causes of delinquency were reported by Healy and Bronner to be (a) very early and improper sex experiences, 14 per cent; (b) unusual autoerotism, 10.5 per cent; (c) use of alcohol in less than 2 per cent; tobacco (more than average) about 9 per cent; (d) extreme lack of parental control, 35 per cent; and (e) extreme parental neglect, 10 per cent; (f) in 19 per cent of cases, alcoholism, immorality and criminality in parents was noted; (g) mentally abnormal parent was found in 7 per cent of 1,000 cases; (h) poverty in 16 per cent, and broken home in 9 per cent, and excessive quarrelling in home 10 per cent, in their group. There is significance in their report that, of their 2,000 cases, 45 per cent gave a determinable background of bad companionship.

These figures then illustrate, to some extent at least, the relationship between neuro-psychiatric disorder and delinquency. As a matter of fact, however, it would not get us very far after examining a delinquent to merely label him with the title of the underlying disease and then refer him back to the court for disposition to a punitive institution. Environmental preventive measures are directly suggested in the previous paragraph. Obviously the bodily health is to be maintained by the usual medical and surgical measures. Adopting a program calling for organized scientific efforts among children when they are first discovered to have personality difficulties, aberrations or retardations will do more than anything else in the prevention of delinquency. The feeble-minded should be supervised when detention in an institution is not required.

In the treatment it becomes incumbent to study the individual's whole life and then to attempt a favorable reconstruction. We must measure his general and special abilities. A personality study, revealing his preferred habitual reactions, should be made. His home life should be investigated; the hereditary endowments and early formative influences require sizing up. The patient's intellectual level, emotional status, and performance capacities are to be determined and judged only along with the medical, social, and other psychological determinations in the particular case. These studies should be made in one well coordinated clinic.

The services of a psychopathic hospital will be required in questionable cases. We know the extreme difficulty met in attempting to ascertain the circumstances of beginning bad habit formation in a delinquent; indeed, many times this appears almost a hopeless undertaking. In the child and adolescent this task is much simpler and from the

standpoint of treatment more times successful. Mental analysis here will lay bare to the youth the abnormal associations with difficult unadjusted emotional experience. New interests will have to be developed many times, and a complete change of surroundings provided for him to facilitate the formation of better habits and to effect a cure.

It is for the social service worker then to keenly observe evidences of nervousness in children especially, and to study their home attachments, special experiences and unusual situations. She should have a common-sense grasp of the influences of abnormal instincts and disturbed emotions on conduct, as well as of the importance of fatigue, pains, food, air, and sleep on the general welfare of the individual. That people are born with varying capacities and have particular complexities to cope with at the periods of infancy and childhood, adolescence, adult life, and senescence, should be impressed on her. These principles should help to guide her in her attitude and approach in case investigations and in her part of the after-care of delinquents.

THE ROENTGEN RAYS IN THYROID THERAPY*

MORRIS I. BIERMAN, B.S., M.D.,
U. S. Veterans' Hospital No. 35, St. Louis, Mo.

In reviewing the pathological physiology of the thyroid gland, we find that the clinical course of thyroid intoxication is usually typical. The gland may or may not show definite external enlargement. Usually at first there is slight enlargement accompanied by minor toxic symptoms. The symptoms gradually increase in severity for about eight months and reach what is frequently termed a "crisis." At this stage all the symptoms are at their height. Subsequently there is a sharp improvement in the clinical course; the pulse slows down, the patient gains in weight, and the general health is distinctly advanced. This change is progressive for about fifteen months, when there is a repetition of the first "crisis." After this, either the active symptoms diminish somewhat, or they run an up and down course. The patient may be invalided for years or the cardiac and general physical degeneration may progress to such a degree as to cause death.

The manner in which the roentgen ray produces its effect on the living cell is not known, but it has been observed that the actively dividing cells are more sensitive than the resting cells; embryonic cells more sensitive than mature cells. In general, tissues which are more resistant to injuries of all kinds are usually more resistant to radiation. With intensive radiation, there is first a period of stimulation and then a period of depression, frequently resulting in death of the cell. If the radiation administered was not a lethal dose the cell may regain its normal condition and function as before. A latent period separates the time of administration of the roentgen rays and that of the first manifestation of their effect, that is, stimulation or depression. The duration of this latent period varies approximately inversely with the intensity of the radiation. Where the radiation is very great, a latent period may be absent. The effects of radiation upon thyroid tumors as well as upon other neoplastic tissue formations are primarily direct, acting on the cells themselves. The inevitable connective tissue formation plays but a secondary part in arresting the disease. The roentgen ray affects the protoplasm as well as the nucleus of the cell, but, as can be inferred, the interference with the nucleus is usually of much greater significance for the function of the cell than the localized changes in the cytoplasm. Any marked interference with the nucleus results in the death of the cell.

These changes produced in the cells are attended by no risk whatever to the subject provided the ordinary precautions peculiar to *x*-ray treatment are observed. There is no surgical shock to contend with as occurs in thyroidectomy. There is no hemorrhage or toxic influence of an anesthetic upon an already degenerated heart muscle. In fact, the entire procedure is safe and harmless, and is attended by no increased excitation such as precedes operative interference. In surgical removal of the thyroid additional toxins are forced into the circulation by handling, and these also must be combated. The inevitable percentage of mortality is another strong argument against surgical procedure. In extreme intoxication unques-

*Read before the Reserve Officers Medical Society, Symposium on Goiter, November 9, 1922.

tionably surgery should not be attempted. It is true that the surgical removal of the thyroid will produce results much more rapidly than roentgen-ray treatment when the correct amount of thyroid tissue is removed, but the uncertainty of improvement, the dangers of operation, and the advisability of first using less extreme methods of treatment will militate against operative interference in favor of radiation. It appears then that radiation is the treatment of choice in all types of toxic goiter.

The technique employed is as follows: The patient's head and upper portion of the body are covered with lead-impregnated material or lead foil with the exception of an area extending from just below the external auditory meatus down to the lower border of the thyroid gland and transversely to the center of the middle lobe. An eight or nine inch spark gap is used, corresponding approximately to ninety or one hundred thousand volts, respectively. Three to six millimeters of aluminum are used for filtration of the rays. This amount of filtration will absorb most of the soft rays which would otherwise be absorbed by the skin and not reach the gland. Each side of the neck is radiated, thus producing what is known as a "cross fire" effect. After this, an area of about three inches square over the upper portion of the sternum is treated so as to produce the same effect in the thymus. This radiation is repeated at intervals of about two or three weeks, depending upon the intensity of the rays, their quantity, and the duration of the exposure. It is not advisable to produce even a mild erythema, the guide to the treatment being the condition of the skin over the area radiated.

It is of extreme importance to maintain a check of the effect of the radiation. This is done by frequent observations of the metabolic rate. The rate should be obtained at least in each interval between treatments, and if possible oftener. When the rate decreases rapidly to within thirty or twenty-five per cent above normal it is well to discontinue treatment at this stage. Where the reduction of the metabolic rate is slow and covers a period of about five or six months, treatment should be carried on until the rate has reached about fifteen per cent above normal. The changes produced by the *x*-ray continue to exert their influence for as long as two or three months after the last treatment, and if treatment were continued until the metabolic rate reached normal the final result would be a negative rate, or hypothyroidism, necessitating the use of thyroid extract.

The thymus is always radiated because of the possibility that Graves' disease is due to primary disease of this gland. It is claimed that thyro-intoxication leads to hyperplasia of the thymus, and a thymus intoxication leads to enlargement of the thyroid. The effects of the thymus and thyroid on other endocrine glands are probably antagonistic. Unquestionably, many patients suffering from thyroid disease are thymus carriers. During the active stages of the disease investigators have found marked hyperplasia of the medulla of the thymus, the presence of many Hassall's corpuscles, and accumulations of eosinophils along the septa of the gland and along the blood vessels. Since institution of thymus radiation the results have fully confirmed in practice what is still regarded as pure theory.

I wish to call your especial attention to the fact that we frequently have thyro-intoxication and even exophthalmic goiter secondary to a focal infection in the tonsils and adenoids, and several cases of toxic goiter have been reported wherein the symptoms cleared up after the removal of diseased tonsils and adenoids. By the above described method of radiation not only is the thyroid gland treated but also the tonsils and adenoids, and if there be tuberculous glands present they also are acted upon beneficently.

The presence of substernal thyroid is quite unusual and probably the only direct means of diagnosis is visualization of a substernal mass by means of roentgen-ray pictures accompanied by thyroid symptoms. Roentgen-ray treatment would be the same as for any retro-sternal mass.

The treatment of thyroids by roentgen-ray is necessarily a long-drawn-out procedure, extending over many months, and at times requiring even two or three years for a complete cure. The roentgen rays attained their popularity through their marked effect in exophthalmic goiter. Here their effects are at times almost miraculous, and the thyroid symptoms may be enormously decreased within a few weeks. The pulse rate will come down, the toxicity diminish, and the patient gain rapidly in weight. Such cases, however, are not the usual course in this therapy. Usually there

is a gradual reduction in all symptoms with a slow increase in the weight of the patient extending over a period of five or six months. As the metabolic rate decreases, the condition of the patient grows constantly better. At times the metabolic rate does not return to normal before one or two years. However, in the meantime, the condition of the patient usually improves to such an extent as to obviate operation.

I would not have you believe that roentgen-ray therapy is efficacious in every case of thyroid intoxication. Rather it is of benefit only in selected cases, cases which show undoubted metabolic hyperactivity. The adenomatous and the exophthalmic types are especially favorable. The border line patients are usually the ones in whom we find the least response to treatment. Many of these are really not hyperthyroids at all, but other intoxications with similar manifestations. The others of this group of border line cases we must admit as failures, just as there are failures in surgical and medical treatment, without being able to explain their lack of response to intensive radiation.

The other forms of goiter, such as the simple goiter, the colloid goiter, the cystic goiter and the goiter of adolescence are not proper subjects for roentgen-ray treatment. Here the only complaint of the patient will be either the disfigurement or the pressure upon the trachea. As the roentgen rays do not appreciably decrease the size of the goiter, it is obvious that they can have little or no effect in these conditions. Here there is but one procedure to follow, and that is surgical removal.

THE NEW DAY IN MEDICINE

In his speech of acceptance of the presidency of the American Medical Association Dr. George E. de Schweinitz went to the very heart of the subject of the relations between the medical profession and the public. There is a new age in medicine other than improved devices in fighting disease. It concerns the policy of the profession toward the public in the application of science. Some physicians have resisted professional progress in this line. They would abolish community hospitals and health centers and maintain the strictly private relation which consists of treatment when the doctor is called.

The answer of Dr. de Schweinitz to this attitude is that a "transition from individual to organized practice already has begun" and that the movement is rapidly spreading. This means that the progressive leaders recognize the profession's obligation to the public in fighting disease regardless of the effect on private practice. They regard the benefits of medicine as belonging to humanity and not to the doctors.

Dr. de Schweinitz cites a recent investigation as showing that when preventive public health measures are put into effect with the co-operation of the physicians, "not only is the number of people applying to the practitioner for treatment increased, but his work has been made simpler and more effective." When idealism is made to pay it ceases to be idealism. But it must not be forgotten that before it was known that idealism in medicine would pay many doctors spent years of devotion to public health rather than to the private fee.

With the profession under such leadership as Dr. de Schweinitz and his supporters the public will feel no misgiving toward the organization of men who, more than any other group of equal number, hold in their hands the power of human life and death. The public, moreover, should ally itself with this organization to stamp out quackery and drive from the profession elements that would exploit the people rather than assist them to health. It can do this by fighting such measures as that put over by the last Missouri Legislature to grant physicians' licenses to applicants who pass a state examination, regardless of their education and training.—Editorial in *St. Louis Dispatch.*

MINNESOTA MEDICINE

OFFICIAL JOURNAL MINNESOTA STATE MEDICAL ASSOCIATION, SOUTHERN MINNESOTA MEDICAL ASSOCIATION, NORTHERN MINNESOTA MEDICAL ASSOCIATION, AND MINNEAPOLIS SURGICAL SOCIETY

Owned and Published by
The Minnesota State Medical Association.
Under the Direction of Its
EDITING AND PUBLISHING COMMITTEE

R. E. FARR, M.D. Minneapolis
H. LONGSTREET TAYLOR, M.D. St. Paul
L. B. WILSON, M.D. Rochester
F. L. ADAIR, M.D. Minneapolis
J. T. CHRISTISON, M.D., St. Paul

EDITORIAL OFFICE
CARL B. DRAKE, M.D., EDITOR
403 Central Bank Bldg., St. Paul

BUSINESS MANAGER
J. R. BRUCE, 403 Central Bank Bldg., Saint Paul
Telephone: Cedar 1683
210 Commercial Bldg., Minneapolis
Telephone: Atlantic 2716

All correspondence regarding editorial matters, articles, advertisements, subscription rates, etc., should be addressed to the Journal itself, not to individuals.

All advertisements are received subject to the approval of the Council on Pharmacy and Chemistry of the American Medical Association.

Contents of this publication protected by copyright.

Subscription Price: $3.00 per annum in advance. Single Copies 25c. Foreign Countries $3.50 per annum.

Vol. VI MAY, 1923 No. 5

EDITORIAL

Some Pollen Bearing Plants of Minnesota With Special Reference to Hay-fever

Since the year 1903, when Dunbar[1] produced conclusive proof of the specific action of pollen in the causation of hay-fever, much work has been done to establish which plant species are the principal contributory factors. The earlier notion that hay plants or members of the grass family alone were responsible for the prevalence of the disease has had to be abandoned, and subsequent research has shown that various other unrelated groups of plants are involved. This has been effected through the recognition, by several students of the hay-fever problem, of certain facts and principles of floral biology which had long been known to professional botanists.

When it was definitely demonstrated, especially through the investigations of Scheppegrell,[2] that the pollen of anemophilous or wind pollinated plants was the principal cause of hay-fever, the problem of discovering which species of any locality were the chief sources of disturbance became greatly simplified.

The work of segregating the offending species has been guided by the fact that, in spite of a vast number and variety of forms, practically only two methods of pollen distribution obtain throughout the whole seed plant series.

In one case the plants have enlisted the aid of insects for the distribution of their pollen, and this class is characterized by showy or attractive flowers and more or less sticky, cohesive, and comparatively heavy pollen. As a general rule, the production of pollen in this class is very sparing, and here belong such plants as asters, goldenrods, dandelions, sunflowers, locusts, roses, and many others which probably through their very showiness are popularly, yet erroneously, held responsible for causing hay-fever. Fortunately, the vast majority of our native species of plants belong to this category.

The second class is composed of species, belonging to many different families, whose pollen is wind distributed. The flowers in this category, unlike those of the preceding, are almost universally small and inconspicuous and offer no means of alluring insects, either through nectar or attractive colors or odors. Furthermore, these flowers are for the most part unisexual, so that in order to effect fertilization the pollen has to be transported from one individual of the species to another. This transfer of pollen is brought about by wind currents and becomes, therefore, a method of chance entirely. The primary requisites of such a hit-or-miss process are an enormous production of dry, light, non-sticky pollen, and a prodigal expenditure of it in order to insure fertilization.

An idea of how enormous this pollen production is may be gained from the fact that an acre of rye on reliable estimates produces about 200 pounds of pollen. How readily such pollen travels through the air is revealed by the fact that aeroplanes, scouting for rust spores in southern Minnesota during the past season, collected pollen on slides exposed at altitudes of two miles.

In the state of Minnesota there are upwards of 450 species of wind-pollinated plants, a goodly proportion of which, if properly tested, would probably be shown to be potential hay-fever plants. The number of species which are chiefly responsible for the prevalence of the disease is much smaller, due partly to their comparatively greater abundance

and partly to their occurrence near to or within centers of population. In addition, the size and buoyancy of the pollen of some species are limiting factors.

The following list includes the principal hay-fever plants occurring in Minnesota.[3] Those marked with an asterisk (*) are regarded as of special importance, and in most cases are recorded as having given positive tests. Those not marked may be suspected mainly because of close natural relationship with species which give positive tests.

The species are arranged for convenience in seasonal groups and the scheme does not take cognizance of natural affinities.

1. VERNAL GROUP: Plants blossoming from the beginning of the season to June 1; composed of trees and shrubs entirely. *Alder, Ash, *Birch, Box Elder, *Cottonwood, Butternut, *Elm, *Hackberry, *Hazel, Hickory, Ironwood, *Oak, Poplar, *Walnut.

2. EARLY SUMMER GROUP: Plants blossoming from June 1 to July 1; composed mainly of grasses, but including also some representatives of the Dock, Goosefoot and Pigweed families. The principal species of this group are *June Grass, or Kentucky Blue Grass; *Timothy, *Red Top, *Sweet Vernal Grass, *Quack Grass, *Brome Grass, *Rye, *Barley, *Orchard Grass, *Wild Oats, Fescue Grass, Porcupine Grass, *Sheep Sorrel, *Dock, *Lamb's Quarter, *Plantain and Tumble Weed.

3. MIDSUMMER GROUP: Plants blossoming from July 1 to Aug. 10; composed mostly of the Goosefoot, Amaranth, Nettle and Plantain families, together with late or long blossoming grasses. The principal species are *Goosefoot, *Russian Thistle, *Shad Scale, *Pigweed, *Tumble Weed, Wild Nettle, Wood Nettle, Clear Weed, Hemp, *Common Plantain, *Wheat, *Oats, Millet, Pigeon Grass, Squirreltail Grass, Wild Rice, Witch Grass, *Corn, *Sorghum, Finger Grass, Wild Rye, *Barnyard Grass.

4. AUTUMN GROUP: Plants blossoming from Aug. 10 until late Autumn; composed almost entirely of species which belong to the *Compositae* or Thistle family. This group includes the most troublesome hay-fever plants, among which the principal species are *Common Ragweed, *Giant Ragweed or Kinghead, *Western Ragweed, *Marsh Elder, *Cockle Burr, and several kinds of *Wormwood or Wild Sage.

C. O. ROSENDAHL.

1. Dunbar, W. P.: Zur Ursache und Specifischen Heilung des Heufiebers. München, 1903.

2. Scheppegrell, Dr. W. P.: Hay-fever and Hay-fever Pollens. Arch. Int. Med., June 15, 1917.

3. A survey of the hay-fever plants of Minnesota, with special reference to their geographical distribution, relative abundance, and time of blossoming, is being prepared by the writer. This will be ready for publication at an early date.

Lady Nicotine

It is with some hesitation that one attempts to summarize the evidence for and against tobacco. The consumption of tobacco has been so much on the increase, especially the use of the cigarettes, that it is highly desirable that further investigations be made in the hope of reaching a more definite scientific opinion as to its exact status.

Generalizations on the subject are likely to be inaccurate, as the weed is used in such a variety of ways and individual susceptibility is such a variable quantity. Recent investigations, however, show that the effects of smoking largely agree with the experimental effects produced by the drug nicotine and the inference is drawn that the symptoms produced by smoking are those produced by nicotine in conjunction with those due to the carbon monoxide contained in the tobacco smoke.

The majority of men and a growing percentage of the fair sex smoke, at times to excess so that the functional effects due to overindulgence are a matter of common experience. The schoolboy's experience with his first cigar is a good example of the toxic action on the unimmunized. The after-breakfast cigar has relieved many a case of constipation through the stimulation of intestinal peristalsis. Alvarez on the other hand has pointed out that smoking tends to diminish the hunger contractions of the stomach itself. Such an action would obviously tend to appease the appetite and might well account for the increase in weight noticed when an individual swears off. Smoking will produce a tumor or aggravate one already present. Temporarily, smoking will relieve sleepiness through its stimulating effect. An excess, however, often inter-

feres with sound sleep. Heart irregularity in the form of extrasystoles, acceleration of pulse and even cardiac pain are well recognized results. Reduced cardiac reserve with the exhibition of "poor wind" has gained general recognition among athletes and doubtless with some reason.

When it comes to evidence of definite organic changes resulting from the use of tobacco, existing proof is very meager. Erb, some time ago, thought that some relation existed between the intermittent claudication of arteriosclerotic origin and excessive use of cigarettes. That the arteriosclerosis became actually aggravated by smoking was his belief. Toxic amblyopia affecting the central field of vision promptly clears up upon the elimination of smoking in early cases, but may show definite optic nerve changes and permanent impairment of vision in protracted cases. The comparative rareness of this condition, however, in comparison to the large number of smokers makes one feel that the danger of organic optic nerve change has been overrated and that other factors may play a large part in its production, notably alcohol. Proof, then, of organic change resulting from the use of tobacco is almost nil.

Tobacco smoke is said to contain a variety of substances, among others sulphuretted hydrogen, hydrocyanic acid, nicotine, pyridin bases, carbon dioxide and carbon monoxide.

Experimentally, as was said, nicotine action largely agrees with that produced by smoking. Experiments go to show that nicotine acts on the central nervous system and the peripheral ganglia and produces acceleration of the pulse, later followed by a depression and, if in strong enough concentration, complete cessation of rythm. The point of action in the heart is not known.

The carbon monoxide content of tobacco smoke is apparently not negligible. One investigator has found in the neighborhood of 1 per cent of the monoxide in cigarette smoke and as high as 5 to 8 per cent in cigar and pipe smoke, the latter figure being as high as occurs in some samples of eliminating gas. Carbon monoxide exerts its poisonous effect through its greater combining power with the hemoglobin of the blood replacing the oxygen. It is estimated that 10 to 20 per cent of the oxygen combining power of the blood can be replaced by inhaling cigarette smoke for an hour at the rate of five times a minute. This might explain the diminution of "wind," pasty complexion and headache following excessive smoking. This combining power of carbon monoxide, which is 225 times that of oxygen, might also well explain why the plethoric individual can tolerate smoking better than the more anemic type.

The examination of large series of smokers and non-smokers has shown little variability in blood-pressure readings, but some elevation in pulse rate in smokers in proportion to their use of tobacco. In some individuals at any rate a marked rise in pulse and blood pressure accompanies the inhalation of a cigarette, lasting fifteen to twenty minutes and the more marked in non-habitues.

The psychologic effects of smoking have been investigated and it has been found that the immediate effect of smoking both on users and non-users is a lowering of accuracy in finely co-ordinated reactions including associative thought processes while decreased accuracy results in habitual smokers if deprived of its use. The speed of reactions is apparently not affected.

Doubtless a certain amount of immunity to tobacco is produced and only an excess of the usual amount of smoking produces noticeable symptoms. The primary stimulation, it may be inferred, results in a reactionary depression so that the sum total of effects produced may well result in greater fatigue in a specified period of time. This inference is borne out by the frequent experience that a prolonged period of strain from various causes is better met by total abstinence from the use of tobacco, while numerous instances are afforded where a crisis of short duration is tided over by an increase in the usual amount of indulgence.

COMMUNICATIONS

March 23, 1923.

Dear Editor:

A further study of hydatidiform mole has been undertaken at this hospital, especially in regard to the frequency of malignancy following this condition. An attempt is being made to collect case reports from outside physicians. Cases reported by physicians will be greatly appreciated, and the physician will be given due credit in any literature published. Address communications to

ROBERT B. KENNEDY, M.D.,
Chicago Lying-in Hospital,
Chicago, Ill.

OBITUARY

DR. GEORGE E. PARSONS

The untimely death of Dr. George E. Parsons, of Elk River, which occurred at the Abbott Hospital, Minneapolis, April 5, 1923, caused widespread sorrow to a host of friends among the laity as well as the medical profession.

Dr. Parsons was born in Elk River, August 9, 1882. His early educational training was received in the Elk River schools. Upon his graduation from the Elk River high school in 1901, he entered the medical school at the University of Minnesota, from which he received his medical degree in 1905. While engaged as an interne in a Minneapolis hospital, Dr. Parsons was called home to assist Dr. Whittemore, who had been taken ill and was unable to go on with his practice. Following the death of Dr. Whittemore, Dr. Parsons took over the practice in Elk River, which he held until the time of his death. He was ever interested in the progress of the medical profession and in county and state medical work. Dr. Parsons had been secretary of the Central Minnesota Medical Society for several years prior to his death and was actively engaged in that capacity up to the time of his last illness.

Dr. Parsons was beloved by everyone in Elk River for his untiring devotion to his medical work in the community. It is felt that his constant attention to duty was the ultimate cause of his untimely death, which came as a result of a weakened condition following attacks of pneumonia and influenza.

Dr. Parsons is survived by his wife, his mother, Mrs. D. H. Parsons of Minneapolis, and one sister, Mrs. Albert Campbell, also of Minneapolis.

DR. CHARLES PLINY SMITH

Dr. Charles Pliny Smith, formerly a resident of Minneapolis, and house physician at Asbury Hospital during the World War period, died at his home in Watertown, S. D., March 21, 1923, at the age of 79 years.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

MINNESOTA STATE MEDICAL MEETING

IMPORTANT NOTICE

The preparation of the program for the annual meeting of the State Association to be held in St. Paul October 10 to 12, 1923, is nearing completion and those desiring to appear on the program must submit their names and subjects to members of the program committee or to the secretary of the State Association by May 5, 1923.

NORTHERN MINNESOTA MEDICAL ASSOCIATION

The annual meeting of the Northern Minnesota Medical Association will be held June 4, 5 and 6, 1923, in Alexandria. The names of those who will participate in the program appeared in the April issue of MINNESOTA MEDICINE.

Sinclair Lewis, the novelist, brother of Dr. C. B. Lewis, president of the association, will address the meeting Monday evening, June 4.

SOUTHERN MINNESOTA MEDICAL ASSOCIATION

The mid-summer meeting of the Southern Minnesota Medical Association will be held in Faribault, Monday, June 11, 1923. The Rice County Medical Society will act as hosts for the meeting, which will be a one-day session, to be concluded with a banquet in the evening.

AMERICAN MEDICAL ASSOCIATION MEETING

The annual meeting of the national association will take place in San Francisco, June 25-29, 1923. The official call announces that the House of Delegates will convene on Monday, June 25th, and the Scientific Assembly will open with the general meeting on Tuesday, June 26th, at 8:00 P. M. The sections will meet on Wednesday, Thursday and Friday, June 27-29, inclusive.

The various county medical societies have arranged for clinics to be conducted throughout the state on July 2 and 3.

Members so desiring may take the Steamship Wilhelmina, sailing from San Francisco July 3, and returning July 25, spending a week in Hawaii.

Arrangements are being made to run a special car to San Francisco for the A. M. A. meeting, provided enough members signify their intention of taking advantage of these arrangements. The special car will be routed via the Northwestern route to Omaha, thence Union Pacific and Southern Pacific to San Francisco by the route of the San Francisco Overland Limited. This car would leave Minneapolis at 6:15 P. M., and St. Paul at 7:00 P. M., Friday, June 22, arriving at San Francisco Monday, June 25, at 2:30 P. M. Those who desire to take advantage of this special car arrangement are requested to communicate with the secretary of the Minnesota State Medical Association, 403 Central Bank Building, St. Paul, before June 15.

The American Proctologic Society will hold its twenty-fourth annual meeting at Los Angeles, June 22 and 23, 1923, preceding the A. M. A. meeting in San Francisco. Headquarters will be at the Hotel Alexandria and the profession is invited to attend the sessions.

CENTENARY OF LOUIS PASTEUR

The centenary of the birth of Pasteur has been chosen as the occasion for a trip abroad by members of the medical profession interested. The visit is being sponsored by the French government and arranged by the Compagnie Francaise du Tourisne for the express purpose of developing travel in France. An honorary committee of American physicians and surgeons has been appointed.

An unusually interesting program has been arranged for the trip through France, beginning July 11th and ending

August 18th, which will include a reception tendered by the Pasteur Institute, School of Medicine, visits to Pasteur's birthplace at Dole, automobile trips to the environs of Paris, the Argonne, Aix les Bains, Evian and Vichy, and through the Alps.

The program and details of arrangements may be procured from L. J. Garcy, General Agent, 281 Fifth Avenue, New York City.

SOUTHWESTERN MINNESOTA MEDICAL SOCIETY

The fortieth semi-annual meeting of the Southwestern Medical Society will be held May 17, 1923, at Slayton, Minn.

The afternoon session will be devoted to the following program:

President's Address—Dr. F. W. Metcalf, Fulda, Minn.

Public Criticism and Opinion of Legislative Efforts by the Medical Profession—Dr. L. Sogge, Windom, Minn.

The Present Economic and Professional Status of the General Practitioner—Dr. Charles L. Sherman, Luverne, Minn.

Experimental Observations on the Relation Between Influenza and Epidemic Hiccough—Dr. E. C. Rosenow, Rochester, Minn.

Case Report—Dr. Ellsworth Johnson, Windom, Minn.

The business session, which will be held at 5:00 P. M., will be followed by a banquet supper, to which members and friends in the profession are invited.

LYMANHURST SCHOOL FOR TUBERCULOUS CHILDREN—PROGRAM OF THE CONSULTING MEDICAL STAFF

All meetings will be held at 7:00 P. M. in the Lymanhurst School, 18th and Chicago. F. E. Harrington, Commissioner; J. A. Myers, Chief of Staff.

May 8—The Tuberculosis Work of the State Board of Health—A. J. Chesley, M.D., Executive Secretary of the Minnesota State Board of Health.
The Past Accomplishments and the Future Possibilities of the Medical Staff of the Lymanhurst School for Tuberculous Children—J. A. Myers, M.D.

May 22—A Study of D'Espine's Sign in a Group of Tuberculous Children—E. D. Anderson, M.D.
Pulmonary Cavities in Tuberculous Children—D. M. Siperstein, M.D., and H. Bauguess, M.D.

June 12—The Innervation of the Organs of the Chest—A. T. Rasmussen, A.M., Ph.D., Associate Professor of Neurology, University of Minnesota.

June 26—Vital Lung Capacity in College Women—Ruth Boynton, M.D.
Vital Lung Capacity in College Men—W. P. Shepard, M.D.

All persons interested in tuberculosis are invited to attend these meetings and participate in the discussions.

OF GENERAL INTEREST

Dr. E. H. Richter, formerly of Sauk Center, is now located at Hunter, N. D.

Dr. L. J. Bowman, formerly of Masonville, Iowa, is now located at Borup, Minnesota.

Dr. H. L. Goss left the Mayo Clinic April 2 to go into private practice in Minneapolis.

Dr. Byron W. Parrott, of Long Prairie, is again at his office after an illness of some duration.

Dr. A. M. Hanson, of Faribault, has gone to Paris to take post-graduate work at the Pasteur Institute.

Dr. and Mrs. J. J. Gelz, who have been spending the past year in Europe, are reported to have returned.

Dr. and Mrs. James E. Arnold, of Vernon Center, are the parents of a baby daughter, born in April.

Dr. Thomas Lowe, of Pipestone, has been appointed a member of the State Board of Medical Examiners.

Dr. and Mrs. S. F. Adams of Rochester are the parents of a baby daughter, Elizabeth Fabyan, born March 12.

Dr. J. A. McIntyre, of Owatonna, is reported as having recovered from a recent serious attack of pneumonia.

Dr. and Mrs. Chas. L. Carman, St. Paul, who have been traveling abroad, are expected home about the 15th of May.

At the recent city election held at Madison, Minn., Dr. Nels Westby was unanimously re-elected to the office of mayor.

Dr. R. T. Glyer has sold his practice at Brooten to Dr. De Wayne Townsend of Belgrade and has located at Sunnyvale, California.

Dr. S. Amberg, of the Department of Pediatrics of the Mayo Clinic, Rochester, returned from a clinical trip to Europe, March 12.

Dr. and Mrs. Charles Bolsta, of Ortonville, have returned from Chicago, where Dr. Bolsta recently completed several weeks of clinical study.

It is reported that Dr. F. H. Bayard, formerly practicing at Monticello, Iowa, has leased offices and will locate at Stewartville, Minnesota.

Friends of Dr. P. H. Irish, of Akeley, will be glad to know that he has fully recovered from a recent illness and resumed his practice.

An evening lecture is held every evening at the Mayo Clinic, Rochester, for the visiting physicians and the members of the staff and fellows of the Clinic.

Dr. A. J. Kaufmann, formerly of Cheyenne Wells, Colorado, has located at Franklin, where Dr. Kaufmann has leased quarters and will engage in practice.

Dr. F. L. Roberts, who has been assisting Dr. O. M. Porter at Atwater for the past several months, has given up his work there to engage in the U. S. Public Health Service.

Dr. A. C. Strachauer, Minneapolis, spoke before the Ohio Academy of Medicine and the College of Medicine at the University of Cincinnati, April 30th, on "Surgery of the Stomach."

Dr. J. A. Watson, Dr. E. S. Strout, Dr. W. E. Patterson and Dr. J. S. Macnie, of Minneapolis, have announced their affiliation with the Eye, Ear, Nose and Throat Clinic, 74 Eleventh Street South.

Dr. Frederick A. Dunsmoor, Minneapolis, has returned from an extended vacation, during which he visited points in California, Florida, Cuba, the Panama Canal, and enjoyed a cruise on the Caribbean.

Dr. J. G. Saam, of Eveleth, has removed to Chicago, where he is taking special work in ear, nose and throat at the University of Chicago. Dr. Saam expects also to take special work at the Rush Medical School.

Eleven fellows began graduate work at the Mayo Foundation, Rochester, April 2. Seven of these men are majoring in surgery, one in otolaryngology, one in medicine, one in dermatology, and one in dental surgery.

Dr. Waltman Walters, of the Mayo Clinic, Rochester, attended a reunion meeting of the Dartmouth College Alumni last month, and is at present on a clinical trip which will include New York, Boston and Charleston.

Our attention has been called to an error which appeared in our April number to the effect that Dr. Haldor Sneve of St. Paul was planning to change his residence to Redlands, California. We are taking pains to correct this misstatement.

Dr. L. E. Claydon, of Goodhue, has returned after an absence of two months or more in attendance at clinics at hospitals in Boston, New York, Cleveland and Chicago. Dr. Claydon also did some special work in the Johns Hopkins Hospital.

Dr. Warren Wilson, of Northfield, was cited in a home newspaper recently as being the oldest physician in point of years as well as practice in Northfield. Dr. Wilson completed his twenty-fifth year of practice at Northfield the 1st of April.

The contract has been let for the construction of a large addition to the Pokegama Sanatorium at Pokegama, Minnesota. It is stated that work will begin almost immediately and the new building will be made ready for occupancy just as speedily as possible.

According to reports made to the Division of Communicable Diseases of the New York State Department of Health, 308 cases of encephalitis lethargica developed in New York State during February of this year, which is more than in any other month during the last two years.

Dr. Florence R. Sabin, Professor of Histology, Johns Hopkins Medical School, and H. F. Traut, of Johns Hopkins, gave Mayo Foundation lectures at the Mayo Clinic March 26. Dr. Sabin lectured on her recent work on the origin of blood cells, and Mr. Traut lectured on new studies in the anatomy of the kidney.

The Bacteriological Laboratory of G. H. Sherman, M. D., on February 15, 1923, filed suit against the International Magazine Company, William Randolph Hearst and others, in the sum of $1,600,000. The suit is based on the articles by Paul H. De Kruif, Ph.D., entitled "Doctors and Drug Mongers" and "Vaccines for Broken Legs," which were recently published and which are claimed to be malicious and false.

By the time this number of MINNESOTA MEDICINE reaches its readers the campaign of the Greater University Corporation of the University of Minnesota for the purpose of raising $2,000,000 will be on. The plan is to erect a stadium as a memorial to the Minnesota soldiers who lost their lives in the World War and a fitting university auditorium to be named in memory of the late President Northrop. The medical alumni are asked to do their share in this worthy undertaking.

The National Board of Medical Examiners has announced their schedule for examinations as follows:

Part I. June 25, 26, 27, 1923
Part II. June 28, 29, 1923
Part I. Sept. 24, 25, 26, 1923
Part II. Sept. 27, 28, 1923

Applications for these examinations must be made on or before May 15, 1923, Further information may be obtained from the Secretary, Dr. J. S. Rodman, 1310 Medical Arts Bldg., Philadelphia, Pa.

Beginning April 9, and continuing over a period of six weeks, the Mayo Clinic, Rochester, will be the scene of a number of meetings and conferences of great interest. April 9, 10 and 11 there will be a Conference of Physiologists from nearby medical colleges. The Japanese Commission of Physicians will visit the Clinic five days beginning April 28. The American Urological Society will meet in Rochester May 21 to 23. The American Surgical Society will meet May 31, June 1 and 2. The Mayo Clinic Alumni Association will hold its annual meeting June 4, 5 and 6, and the Interurban Clinical Society will meet in Rochester June 20 and 21.

One of the very recent pieces of literature sent out by the Palmer School of Chiropractic makes the following bold statement: "Millions of men and women today wish for a professional training. They find in almost every profession obstacles which, under the circumstances, they cannot surmount—long years of study or educational requirements which they do not possess. Chiropractic, as a profession, has neither of these insurmountable obstacles. We require a reasonable degree of intelligence and realize full well that this cannot be gauged by the amount of time one may have spent in school. Our scientific course covers a period of three collegiate years of six months each, which may be completed in eighteen consecutive calendar months."

NEW AND NON-OFFICIAL REMEDIES

During February and March the following articles have been accepted by the Council on Pharmacy and Chemistry for inclusion in New and Non-official Remedies:

ELI LILLY AND CO.:
Schick Test and Schick Control-Eli Lilly & Co.
Diphtheria Toxin-Antitoxin-Eli Lilly & Co.

H. K. MULFORD CO.:
Pneumococcus Antibody Solution, Types I, II and III Combined-Mulford.

PARKE, DAVIS & CO.:
Diphtheria Toxin and Control for the Schick Test-P. D. & Co.
Neo-Silvol.
Mercurosal.

ABBOTT LABORATORIES:
Sulpharsphenamine-Abbott.

BORCHERDT MALT EXTRACT CO.
Borcherdt's Cod Liver Oil and Iron Iodide.

E. R. SQUIBB & SONS:
Sulpharsphenamine-Squibb.

NON-PROPRIETARY ARTICLE:
Sulpharsphenamine.

Tincture No. 111 Digitalis-P. D. & Co.

Bacillus Acidophilus Milk-Lederle.—Whole milk cultured with *Bacillus acidophilus.* It contains not less than fifty million of viable organisms *(B. acidophilus)* per c.c. During recent years reports have been published which indicate that the growth in the intestinal canal of the normally present *Bacillus acidophilus* may be increased so as to make it the predominating organism, by the administration of milk inoculated with *B. acidophilus,* by the administration of viable cultures of *B. acidophilus* in conjunction with lactose (sugar of milk) or by administration of lactose alone. The therapeutic value of cultures of *B. acidophilus* is still in the experimental stage. For a discussion of the actions and uses of lactic acid ferment preparations, see New and Non-official Remedies 1922, p. 156. Bacillus acidophilus milk-Lederle must be kept on ice and should be used within one week of the expiration date which appears on each package. Lederle Antitoxin Laboratories, New York. (Jour. A. M. A., Feb. 3, 1922, p. 323.)

Theocin Sodium Acetate.—A brand of theophylline sodioacetate-N. N. R. (See New and Non-official Remedies 1922, p. 357.) Winthrop Chemical Co., New York. (Jour. A. M. A., Feb. 10, 1923, p. 401.)

Diphtheria Toxin and Control for Schick Test-P. D. & Co.—Diphtheria Immunity Test (New and Non-official Remedies 1922, p. 320) marketed in packages containing one vial of 0.1 c.c. of undiluted, standardized diphtheria toxin, one vial of 5 c.c. of sterile physiologic solution of sodium chloride, one vial of 5 c.c. of diluted control of Schick test and one sterile syringe point. Each package contains material sufficient for fifty doses. Parke, Davis & Co., Detroit, Mich. (Jour. A. M. A. Feb. 17, 1923, p. 475.)

Diphtheria Toxin-Antitoxin Mixture-Lilly.—A diphtheria toxin-antitoxin mixture (see New and Non-official Remedies 1922, p. 282), each c.c. constituting a single human dose and containing 3L+ doses prepared in accordance with the requirements of the U. S. Public Health Service. Marketed in packages of three vials sufficient for one treatment. Eli Lilly & Co., Indianapolis, Ind.

Schick Test-Lilly.—A diphtheria immunity test (see New and Non-official Remedies 1922, p. 320) marketed in packages containing one vial of diphtheria toxin sufficient for ten tests and a vial of sterile physiological solution of sodium chloride and in packages of ten vials containing toxin sufficient for one hundred tests accompanied by ten vials of sterile physiological solution of sodium chloride. As a control, the Schick test control, representing diphtheria toxin of the same lot treated to destroy the specific exotoxins is supplied. Eli Lilly and Co., Indianapolis, Ind. (Jour. A. M. A., Feb. 25, 1922, p. 553.)

Mercurosal. — Disodiumhydroxymercurisalicyloxyacetate. Mercurosal contains from 43.0 to 43.8 per cent of mercury in organic combination. It is claimed that mercurosal is relatively free from irritant action, that it is eliminated without untoward effects on the kidney, and that the toxicity is relatively lower than mercuric chloride or mercuric salicylate. Mercurosal is intended for the mercurial treatment of syphilis. It is administered either intramuscularly or intravenously. Mercurosal is marketed in two forms: Mercurosal Intravenous, tubes containing mercurosal 0.1 gm., and Mercurosal Intramuscular, tubes containing mercurosal 0.05 gm. Parke, Davis and Co., Detroit, Mich. (Jour. A. M. A., March 24, 1923, page 844.)

Pneumococcus Antibody Solution, Types I, II and III Combined.—An aqueous solution of the specific pneumococcus antibodies, Types I, II and III in equal proportions, approximately free from the proteins of horse serum. There is some evidence that this antibody solution is of value in the treatment of lobar pneumonia.

Pneumococcus Antibody Solution, Types I, II and III Combined-N. N. R.—Marketed in packages of one 50 c.c. double-ended vials with a complete intravenous outfit, and in packages of one 50 c.c. double-ended vials. H. K. Mulford Co., Philadelphia. (Jour. A. M. A., Mar. 24, 1923, page 844.)

Sulpharsphenamine.—The salt disodiumdiaminodihydroxyarsenobenzenedimethylenesulphonate, adjusted by the addition of inorganic salt to an arsenic content of from 18 to 20 per cent. The arsenic content of 3 parts of sulpharsphenamine is approximately equal to 2 parts of arsphenamine. The actions and uses of sulpharsphenamine are the same as those of neoarsphenamine, over which it is claimed to have the advantage of greater stability of solution in the presence of air and of permitting subcutaneous injection. For subcutaneous or intramuscular use the drug is dissolved in sterile, freshly distilled water in the proportion of about 0.1 gm. to 0.3 c.c.; for intravenous use a greater dilution is desirable. (Jour. A. M. A., Mar. 31, 1923, page 919.)

Sulpharsphenamine-Abbott.—A brand of sulpharsphenamine-N. N. R. It is marketed in ampules containing respectively 0.2 gm., 0.3 gm., 0.4 gm., and 0.6 gm. The

Abbott Laboratories, Chicago. (Jour. A. M. A., Mar. 31, 1923, page 919.)

PROPAGANDA FOR REFORM

Ginseng.—Ginseng has found no place in modern therapy. However, it has been reported that infusions of the extract of ginseng root are diuretic. But the most recent study has shown that the drug does not affect the nitrogen metabolism. Even the quack would find it difficult to discover a tenable potency on the basis of which the use of ginseng could be "boosted." (Jour. A. M. A. Feb. 3, 1923, p. 328.)

Mercupressen.—From the advertising issued by the Barsa Chemical Co., Inc., 28 W. 23d St., New York, for Mercupressen, this product is essentially the same as that which the Spirocide Corporation, 28 W. 23d St., New York, marketed as "Spirocide." Spirocide was claimed to be composed of metallic mercury, copper sulphate, cypress cones, henna, nutgalls and dried pomegranates. The product was sold in the form of tablets. For use the tablets were ignited and the fumes inhaled by the patient. The Council on Pharmacy and Chemistry held that the claims for Spirocide were unproved and unwarranted and that the routine use of an inexact method for the administration of mercury is detrimental to sound therapy. The Council's rejection of Spirocide was subsequently fully sustained by the investigation of the inhalation treatment of syphilis carried out by Cole, Gericke and Sollmann. (Jour. A. M. A., Feb. 3, 1923, p. 344.)

Bayer 205.—This is said to be a specific trypanosomid. It is said to have no effect on organisms other than the trypanosomes, even those that are nearly related such as the spirochetes. Most of the work carried out in this country has been carried out with small laboratory animals, but the successful treatment of two human cases of trypanosomia is reported. The composition of Bayer 205 is secret, though a hint as to its chemical composition has been discovered which suggests that it is a dye of the naphthalene series. It is hoped that in the near future the exact composition of Bayer 205 will be declared so that scientists will feel justified to carry out controlled experiments with the drug. For the present the preparation is in the experimental stage. (Jour. A. M. A., Feb. 10, 1923, p. 406.)

A Patented Consumption Cure.—The U. S. Patent Office has issued patents for many preparations to be used in medicine for which there has not been the slightest scientific justification. The most recent and most flagrant lack of intelligent patent law administration is to be found in a patent issued to Sergluson and exploited by the Savrite Medical Manufacturing Co., Los Angeles, Cal., for an alleged cure for tuberculosis.

This is the patented cure: Pure olive oil, 1 gallon; squill root, 3 pounds; bitter almonds, 1¼ pounds; nettle (the plant except the root), 1½ pounds; red poppy flower petals, 1 pound. These various ingredients are to be mixed, put in a closed container, gradually warmed and left standing for about 72 hours, when the mixture is squeezed, mixed and filtered. The filtrate comprises the "cure." (Jour. A. M. A., Feb. 10, 1923, p. 420.)

The Patent Office a Federal Rip Van Winkle.—No branch of our government is of greater importance to the progress of the country than the Patent Office, provided it is intelligently administered. When the Patent Office is used, however, for an extension of the nostrum business founded on the abuse of patent and trademark laws, it becomes a menace to public health. In 1918 a report of the Committee on Patent Law Revision of the Council on Pharmacy and Chemistry recapitulated the effort made for years by the American Medical Association to bring about patent law reform and detailed some of the cruder forms of Patent Office insufficiency in the granting of patents for medicaments. The issuance recently for a patent on a preposterous mixture of squill root, nettle and red poppy flowers in olive oil as a remedy for tuberculosis is a further illustration of patent office incompetency.

Both common sense and consideration of the health of the public suggests that the patent office should consult the scientific departments of the United States government conversant with medicine and therapeutics in the issuance of patents on medicinal preparations. (Jour. A. M. A., Feb. 10, 1923, p. 405.)

Strychnin and Disturbances of the Vision.—The use of strychnin in the treatment of certain visual disturbances appears to be extensive. Its use in opthalmology was introduced in 1830. In text-books the claims for the usefulness of the drug in these conditions run from mere assertions regarding the usefulness of the drug in certain eye conditions to statements that it actually increases the acuity and field of vision within an hour after injection of therapeutic doses. Occasionally there is a statement to the effect that the good results from strychnin are due to psychic influences. And now, ninety-two years after its proposed use, experiments have been made to indicate that the latter opinion is probably correct and that strychnin is without action on vision. (Jour. A. M. A., Feb. 10, 1923, p. 406.)

Brown's New Consumption Remedy.—The Postoffice Department has issued a fraud order against B. H. Brown, M.D., of Jacksonville and St. Augustine, Fla., and Brown's Magnolia Remedy Co. For some time Dr. Brown, a negro, has been advertising Dr. Brown's New Consumption Remedy, especially to members of his own race who are afflicted with tuberculosis. In 1917 the federal authorities prosecuted Brown under the Food and Drugs Act, holding that the claims for the preparations were false and fraudulent. Though convicted, he continued making his claims in newspaper advertisements, and in circulars that answered these advertisements. While the Department of Agriculture is helpless to prevent this form of fraud under the provisions of the Food and Drugs Act, the Post Office authorities are able to reach this form of fraud. The Department filed charges against Brown and after hearing the defense issued a fraud order against Magnolia Remedy Co., and E. H. Brown. (Jour. A. M. A., Feb. 17, 1923, p. 495.)

Allen's Goiter Treatment.—At Sheffield, Iowa, the Allen Remedy Co. conducts a mail order business in "Dr. C. J. Allen's Goiter Treatment." The A. M. A. Chemical Laboratory analyzed the Allen nostrum and found it to consist essentially of ferrous iodide and hydrogen iodide

(hydriodic acid) in a colored and flavored syrup. The serious side of the Allen Goiter Remedy Co. business is the indiscriminate sale of the nostrum to those who may be, and are likely to be, suffering from exophthalmic goiter. It is well known that the use of iodin is likely to aggravate this disease and hence it is not surprising that physicians are beginning to report serious results from the use of the Allen preparation. (Jour. A. M. A., Feb. 24, 1923, p. 572.)

Pan-secretin Compound.—Harrower's Pan-secretin Compound, according to the advertising circular, is "an endocrine combination embodying: (1) a specially prepared extract of Islets of Langerhans (pancreas tail), rich in its incretory glycolytic product; (2) an acid extract of the duodenal mucosa containing the pancreatic activator secretion, and (3) a small dose of desiccated calves' tonsil." This formula emphasizes the fact that some of the commercial houses are carrying us back to the days of the shotgun nostrum. It would seem hardly necessary to say that such a combination as Pan-secretin Compound is unscientific, and there appears to be no scientific evidence to warrant the belief that such a combination is of value. Four years ago the Council on Pharmacy and Chemistry published a report on some of the Harrower "pluriglandular" mixtures and gave reasons why such unscientific combinations were not acceptable for New and Non-official Remedies. (Jour. A. M. A., Mar 10, 1923, page 717.)

Prescribing Codein.—Codein is a derivative of opium and hence prescriptions for it come within the purview of the Harrison Narcotic Act, no matter what the individual physician may believe in respect to its habit-forming properties. (Jour. A. M. A., Mar. 31, 1923, page 945.)

Biologic Reactions of Arsphenamin.—The complexity of the physical and chemical properties of arsphenamin probably accounts for the complexity of its biologic reactions resulting from the passage through the body. Among the most disturbing of these reactions are the nitritoid or anaphylactoid symptoms occurring after intravenous injection. The earlier studies of the anaphylactoid reactions from arsphenamin cleared up certain features, but left the underlying causes untouched. The investigations of Jean Oliver and his collaborators lead to the conception that arsphenamin can exist in the colloidal state, temporarily at least, and that the temporariness of this state is essential to anaphylactoid reactions. The investigators find that arsphenamin has a fairly constant agglutinating titer for blood corpuscles. The presence of electrolyte is essential for agglutination. The work suggests that agglutination by arsphenamin occurs during the transition stage from its colloidal into the crystalloidal state in the circulation, and that stabilization in the colloidal state prevents the agglutination. From their work they conclude that there are two phases to the reactions from arsphenamin: (1) the early or physical phase, which is concerned with the physical properties of the agent and results in the corpuscular agglutination with multiple embolism, the outcome being fatal sometimes, and (2) the later or chemical phase that results in parenchymatous degeneration of viscera (kidney and liver), this being due to the action of the arsenic ions in the usual way. (Jour. A. M. A., Mar. 31, 1923, page 920.)

PROCEEDINGS OF THE MINNESOTA ACADEMY OF MEDICINE

Meeting of March 14, 1923

Dr. H. Longstreet Taylor, Presiding

Dr. L. C. Bacon gave a report of the end results of a case of carcinoma of the breast.

During March of 1920 I removed by the radical, so-called Halsted, operation, a scirrhus carcinoma of the right breast from a woman aged 57 years. Lymphatic involvement was very extensive; many large glands were found in the axilla, in the subclavicular region, in the triangles of the neck both anterior and posterior to the sterno-mastoid muscle, and they were also prominent in the subscapular region. I, of course, told her family that with so extensive a growth it must already have invaded the mediastinum or other deep areas and that it could not be expected that she would live more than a few months. She was sent to Dr. Schons for *x*-ray treatment and it might be worthy of note that she was very much prostrated by the several series administered. A reaction with rise of temperature and great exhaustion followed them, and it was with difficulty that she was persuaded to continue. Following this and two months after the operation she developed an abscess of the right lung which persisted for about eight months. Fever, bad heart action and great prostration made operation seem out of the question, but all of this time she continued to cough up large quantities of purulent matter mixed with shreds and bundles of fibrous material. This process finally cleared up with no evidence of a right lung remaining except a small portion of the apex. (I might pause here to state that I have seen several cases develop a serious pleuritic effusion after the Halsted operation but this is the only lung abscess.)

By the end of the first year after her operation she began to regain her strength and increase in flesh until she had regained her normal weight. Her scar was healthy, the right thorax somewhat flat and with very little movement during respiration. The heart had moved to the right, bringing the apex under the left margin of the sternum. The left lung area of resonance seemed to have increased. She became short of breath rather more easily after exertion, and at times had some pain in the region of the heart which would last for a few days and then disappear. Other than these defects and the natural fear of the return of the disease she has enjoyed life for two years, visiting friends, carrying on her home, working in her garden in summer, etc.

The first of this month, March, she contracted an influenza, soon became cyanotic, the heart action became weak and rapid, a hypostatic condition of the lung developed and she died the fourth day.

An autospy was permitted. No carcinomatous or other growths could be found in the chest or abdomen. Because there had been no cerebral or nerve disturbances the brain and spinal cord were not examined. The abdominal contents appeared normal. The thorax contained a small amount of serous fluid. The right lung was represented by a piece of crackling lung tissue about 2 inches in breadth

by 1.5 inches in height and rather a small mass of scar tissue of about the same dimensions to account for the rest of the lung. The parietal pleura was smooth and apparently healthy; not thickened. The remnant of the right lung was not adherent except for a slender band of fibrous tissue running from it to and through the mediastinal tissues and attaching to the pericardium. While this band had ceased to be inflamed, it will probably account for the occasional attacks of pain which she experienced. The heart was somewhat enlarged, the muscles firm and the valves normal. The left lung showed the conditions usual in hypostasis.

There is much room for speculation in this case and I would be grateful for enlightenment. While we all know that the scirrhus type of carcinoma of the breast is sometimes slow in its progress, in view of the extensive lymphatic involvement and the large size of some of the remote glands I cannot believe that the process had not progressed beyond the field of operation and I must give the *x*-ray credit for its destruction. What part the *x*-ray, with its possible destruction of carcinomatous tissue, may have had to do with the lung abscess, I would like to know. What would the reaction following the *x*-ray treatment mean? Could the *x*-ray have caused devitalization of lung tissue in the absence of new growth? At no time did the patient suffer with an erythema after the *x*-ray exposures.

Discussion: DR. DENNIS: Dr. Bacon asked about the possible effects of *x*-ray. I reported years ago a case of sarcoma of the chest wall which was resected. A year later the woman returned with a mass the size of a hen's egg near the left breast. She was four and one-half months pregnant. I removed the mass in the breast and resected a two-inch piece of the diaphragm. She had a stormy convalescence but is alive and well today. She had repeated *x*-ray treatments for from one and a half to two years, and with this history of malignant growth with recurrence, it seems that her present freedom from trouble must be ascribed to the *x*-ray. I think probably there are certain tumors that can be arrested by *x*-ray or radium, but that most cannot. It depends on the malignancy of the tumor.

In regard to the reaction following the *x*-ray or radium treatment, that is quite common. Intensive radium or *x*-ray treatment will cause a certain grade of cell necrosis and the resulting absorption often causes headache and malaise that may last for a number of days.

DR. HENRY L. ULRICH reported a case of bone tumor.

The plates are of a patient 54 years old, male, whose family and personal history are negative. His present illness dates back two years, when he noticed some loss of function of the right shoulder. It started as stiffness, which he thought was rheumatism, and later some pain developed. There is no history of injury of the shoulder or hip that he can remember. The hip started some time last January.

The patient presented on physical examination some atrophy of the shoulder girdle with some loss of function. He was unable to raise the arm above the level of the shoulder. The right chest did not move as well as the left though ausculation and percussion were negative throughout. The heart was negative. Abdomen was negative. Prostate was negative. There was a right inguinal hernia. The right thigh was much atrophied; he was unable to flex the thigh unless he lifted the knee with both hands. There was some atrophy of the leg muscles. The reflexes were all normal except that the abdominal were absent.

The blood picture was normal except for a mild anemia and slight leucocytosis. The blood chemistry was normal. The blood Wassermann was negative four times in this laboratory, three times at two others, and positive twice at the State Board laboratory.

Three months later the patient presented himself with practically the same findings except that his general health and nutrition seemed improved. A mass was situated on the left thorax in the posterior axillary line, about the size of a small egg, sessile and securely attached to the intercostal fasciæ. There was no pain on palpation or pressure. The mass was visible in the *x*-ray plate of the chest but the shadow was external to the thoracic cavity. The condition of the shoulder and hip had not changed much in function or appearance except that there was more bulging above and laterally to the hip joint. There seemed to be some swelling along the spinous process of the right scapula. The blood picture at this time was practically like the former one except that the hemoglobin had come down ten per cent.

Our opinion of this pathology, particularly of the hip, suggested at the time of the patient's first appearance that we might be dealing with an osteomalacia. This was based on the fact that the rami of the ischia and of the pubes respectively were pushed in and not fractured, and because we could not find any primary focus of malignancy anywhere.

The second batch of plates, three months after use of cod liver oil and calcification measures, show progress of this process which is evidently a malignancy. At this time we also noticed a second mass at the lower end of the left scapula.

We sent these plates to Dr. Bloodgood for diagnosis. Max Kahn, his roentgenologist, suggests that we are dealing with a central sarcoma, probably giant cell sarcoma of malignant character. Dr. Bloodgood personally thinks we are dealing with a mediastinal tumor or multiple myeloma.

Discussion: DR. COLE: I feel, after looking at the plates, that the most probable thing is metastatic carcinoma. I think it could be differentiated from the *x*-ray. Sometimes it gives a very positive picture but when it is in the flat bones, as in the ilium, the diagnosis seems to rest between metastatic carcinoma and multiple myeloma. Metastatic carcinoma is much more common and sometimes is not painful. We have had three cases during the last year or fifteen months more multiple than this that gave no history of pain at all. There was some nerve pain, but no bone pain from the lesion itself. It is very difficult to arrive at the primary source of some of these carcinomata. I remember one negro who had general carcinomatosis, with primary symptoms of carcinoma of the back. At autopsy I could not find the primary focus.

DR. HEAD: Did you say there was no Bence-Jones protein in the urine?

DR. ULRICH: That has not been looked for. Dr. Blood-

good suggested that, but I have not yet done so. Of course carcinoma has been considered. The interesting thing about the case is the selective sites, the picking out of two flat bones on the same side and a certain area around the articulations. Of course, we have seen multiple carcinoma of bones but I have never seen one around joints like this, if this is carcinoma.

Dr. R. E. Farr gave the following case report. (Motion pictures were taken during and after the operation and were presented.)

J. P. B., age 56, formerly a storekeeper. Entered St. Mary's hospital January 21, 1923.

History: Patient is married, has two children living and well. His general health has always been good with the exception of varicose veins and ulcers of the left leg in 1920. The present trouble began three years ago when he began to cough occasionally and his voice became hoarse and rasping. This condition remained stationary until three months before entering the hospital. He has had some pain in the region of the larynx and has lost twenty pounds in the last year, which he attributes to change in occupation. There is a history of possible encephalitis lethargica three years ago and he dates the beginning of his trouble from this time.

General examination was negative excepting some palpable glands in the left sublingual region.

Examination. Laryngoscopic (Indirect). Shows an ulcerated growth replacing the left vocal cord and arytenoid. There is marked injection and swelling on the left side of the larynx. This was done on January 22nd. (Direct.)

This examination, made the following day, confirmed the findings of the first examination. There was an attempt made to remove a piece of the growth but on account of its being so flat and resistant it was unsuccessful.

Subcutaneous tuberculin tests proved negative, as did the lungs to physical and *x*-ray examination. At this time the patient's nurse was found to be a diphtheria carrier and the patient was allowed to go home for a few days. Blood Wassermanns were taken and were negative.

Patient re-entered the hospital on February 2, 1923.

First operation. Preliminary mobilization of the larynx and trachea with iodoform packing (Crile). Anesthesia—local infiltration block. A middle incision was made, the thyroid isthmus was divided and the trachea and right side of the larynx were completely isolated with iodoform gauze.

After the first operation the patient developed broncho-pneumonia and became very ill. The incision became infected with streptococci. The patient left the hospital two weeks after the operation and the incision was treated by the Carrel-Dakin method.

He re-entered the hospital March 2, 1923, one month from the time of his first operation. Smears showed from twenty to thirty bacilli to the field. One week later the number of bacilli had been reduced to four to the field.

Second Operation. March 10th. Tracheotomy, Laryngotomy and Laryngectomy. Anesthesia—local subdermal infiltration block. The vertical incision was converted into a T-incision at the top. The trachea and larynx were once more isolated and 2 c.c. of 4 per cent cocain was introduced into the trachea by means of a fine needle.

Tracheotomy: A transverse incision was made half-way through the trachea just below the larynx.

Laryngotomy: The voice box was opened by means of the rib shears, and the growth was found to have destroyed the left vocal cord and to have extended upward towards the epiglottis, having the area of a half-dollar. It was ulcerated and approximately 1 cm. in thickness. It was macroscopically malignant.

Tracheotomy: The trachea was completely divided and sutured to the skin at the substernal notch.

Laryngectomy: Topical applications of cocain were made to the epiglottis and posterior fauces. The larynx was removed, a large catheter introduced through the nose into the esophagus and the wound was closed with chromic gut. A cigarette drain was placed in the upper angle of the wound and another behind the displaced trachea. The skin was closed with silkworm. A tracheotomy tube was introduced.

Post-operative Treatment. The patient was encouraged to move around freely. Moist gauze was placed over the tracheal opening and a basin of water containing tincture of benzoin was placed near the bed and kept steaming continuously. His pulse during the operation remained at 80; his respirations and color remained normal. Since the operation his temperature has ranged between 101 and 103 rectal, and the pulse has remained below 100. There has been no pulmonary involvement and he is now sitting up, this being the fourth day. He is taking large quantities of nourishment through the esophageal catheter. A duodenal tube was substituted for the catheter today.

(Subsequent note by Dr. Farr.)

Pathological report showed chronic inflammation, no malignancy. The great destruction of the larynx, approximately three-fourths of its lining membrane, seemed to be an absolute indication for laryngectomy. Do you think I met the indication?

Discussion: Dr. A. Schwyzer: I just want to say that I believe that is a field where local anesthesia is valuable. If it had been tuberculosis I would imagine it would have been a good idea to make a little separate incision through the skin and draw the trachea out there. After a week or ten days very often when there is tuberculosis, it gets loose and retracts. I have opened the larynx and taken out about half and burned out what I could not remove, and closed it up again after removing the vocal cord.

Dr. Farr: I wish to thank Dr. Schwyzer for his discussion. In doing the one-stage operation it is desirable to bring the trachea out through a stab wound in the skin. However, in the two-stage operation this is impossible, as the skin has already been divided to the suprasternal notch. I have operated upon only one tuberculous case and this man died a few days later of broncho-pneumonia.

Frozen sections might have been made in this case. However, with this large tumor there seemed to be nothing to do but to remove the larynx. I am gratified that Dr. Schwyzer concurs with me in my judgment in this regard. The pathological report furnished by Dr. E. T. Bell of the University shows no malignancy, only a chronic inflammation. It is to be noted that this process had completely destroyed the left vocal cord and the anterior attachments of the right and had extended up to the epiglottis.

DR. GEO. DOUGLAS HEAD read a paper entitled "A Clinical Study of Early Diabetes." Several charts were shown.

Discussion: DR. ULRICH: I think Dr. Head makes a very pretty point about the night urine. There is no question that the twenty-four hour specimen may dilute the sugar to such an extent that, if not enough urine is used by the technician, the sugar may not be discovered; by keeping it in concentrated form of course it shows up readily. Some of these curves of blood sugar shown must be of cases of late diabetes, or they are evidence of dietetic or laboratory error. In fact these charts are merely studies of renal threshold. We do not know what sugar tolerance is. Not until we know more about sugar metabolism (that is, the physiology of it) will we be able to speak of a "tolerance." We have been discarding urine examinations practically altogether in our diagnostic methods in these types of cases. We use blood sugar curves. In cases of doubt we try what is called erroneously "glucose tolerance test," which in reality is nothing but reaction curves in the blood to sugar. These curves are quite characteristic in diabetes. Recently Dr. Rigler and I have standardized a technic in which small quantities are injected intravenously with characteristic reaction curves. This method makes the process simple, standard and accurate. Such a technic makes us feel more accurate about our diganosis as to whether we are dealing with diabetes.

In regard to Dr. Head's clinical classification, I think it is a very striking grouping and extremely worthy of consideration.

DR. CROSS: Dr. Head's paper exemplifies clinical research upon which the future progress of medicine must depend for its progress to a great extent. The actual reaction of the patient, or, better, the group of patients, is the ultimate source of medical knowledge. He has shown in this group a practical study of early diabetics or potential diabetics. The question naturally arises as to whether, aside from diabetes, there may not be temporary disturbances of starch metabolism, due to functional derangement of the pancreas, or some other cause, but which does not tend toward a chronic form of hyperglycemia. Advances are being made in the study of these conditions.

A separate examination of the morning and evening urine is undoubtedly a valuable procedure, and, as has been shown, will detect the presence of sugar which might be absent in single specimens.

The apparent relationship between hyperglycemia and the various bizarre symptoms which Dr. Head has found in some of these individuals is difficult to prove. Until we know more than we do at present about the cause of diabetes we cannot satisfactorily prove such relationships. Tissue starvation does not quite explain it.

Of equal importance with the study of diabetes already present in the early form is the recognition of the potential diabetic or the person who is likely to develop it. The blood sugar curve, under measurable feeding of carbohydrates, furnishes a very satisfactory method of recognizing these individuals. Goetsch and others have shown that the curves of the blood sugar, under given conditions of feeding glucose according to body weight, are capable of rather accurate interpretations. As yet this is the most reliable method of detecting the potential diabetic.

DR. HEAD: I presume that perhaps Dr. Ulrich's point is well taken with relation to some of these cases. The reason I have preferred to present them as cases of diabetes is the fact that not only do the urine and blood studies, as I look upon them, indicate that they are very suspicious cases, but also the fact that they almost without exception responded to dietetic management. That is, the individual who complains of the symptoms described, with a little sugar in the evening specimen of urine and a little hyperglycemia, even though there is arteriosclerosis of the renal vessels, I consider a case of diabetes mellitus if, when his carbohydrate intake is cut down, the symptoms of which he complains disappear. What we are trying to do is to relieve these patients of their aches and pains. That is the reason why I have presented these cases so positively as true cases, either of diabetes mellitus, or potential diabetes. In the vast majority of them, very marked relief has been secured by dietetic management. And curiously enough, instead of responding easily and promptly to dietetic management, as one might expect, I find that is not the case. Some are very persistent and slow in responding, but their symptoms do clear up and usually only when the blood sugar strikes normal.

Personally, I am of the opinion that all of these cases (or at least the vast majority of them) that have been presented were mild or potential forms of diabetes, and, if they had continued to pursue the ordinary course of living, would become diabetics.

DR. H. B. SWEETSER: I would like to ask Dr. Head one question, and that is, in a case in which he finds these indefinite symptoms, i.e., aching, exhaustion, etc., and he suspects that he may be dealing with one of these diabetic cases and finds no sugar at all, is there any way by which he may develop sugar in the urine and arrive at a proper diagnosis?

DR. HEAD: Of course there is a well known method of feeding a patient 200 gms. of glucose with the idea of producing glycosuria in a patient who is unstable with relation to his so-called sugar tolerance. I have never used it in individuals of this type such as I have described tonight. It might be a very valuable thing to do, especially in persons past middle age.

PROGRESS

Abstracts to be submitted to Section Supervisors.

MEDICINE

SUPERVISORS:
F. J. HIRSCHBOECK,
FIDELITY BLDG., DULUTH
THOMAS A. PEPPARD,
LA SALLE BLDG., MINNEAPOLIS

THE INFLUENCE OF OLIGURIA ON NITROGEN RETENTION IN THE BLOOD—O. H. Perry Pepper (Amer. Jour. of Med. Sc., January, 1923): The influence of a marked reduction in the daily quantity of urine upon the excretion of nitrogen, and on the nitrogen level in the blood, has not received sufficient attention.

In acute nephritis there may be a decrease in the urinary output, a failure to excrete sodium chlorid, and a moderate rise in the level of the various fractions of the non-protein nitrogen in the blood. In such cases it is not necessarily due to any impairment of the urea-excreting function of the kidney, but may be due solely or in large part to the interference with water elimination, with a nitrogen retention in the blood as a result. It is known that unusual formation of urea may temporarily exceed the kidneys' excreting capacity, and result in an increase in the blood urea, as, for example, in an excessive protein diet, rapid destruction of body protein, as in certain acute infections and intoxications, etc. In rapid dehydration of the body this has also been observed, as, for example, in obstinate vomiting with diarrhea.

Ambard has estimated 5.6 per cent as the maximal concentration for urea in the human urine. MacLeod gives a figure a trifle higher than this, and Cushny a little lower, but the estimate made by Ambard is at least nearly correct. In order for the human body to eliminate the usual level of 30 gm. of urea per day, an excretion of 500 c.c. of urine is necessary with normal kidney function to bring this about.

In acute or chronic nephritis with edema there is constantly a diminution of the amount of urine. If there is complete anuria, urea and the other non-protein nitrogen retention products remain in the body, and yet the kidney's ability to concentrate urea may be entirely unimpaired, the alteration in the blood chemistry being due to a diminished output of water, and the failure of the kidneys normally to concentrate beyond the stated per cent.

Pepper calls attention to the fact that in certain cases of nephritis with some nitrogen retention the phthalein elimination remains high. This may in part be explained by the greater concentration ability of the kidney for the dye, so that while the kidney may be able to excrete a normal percentage of phthalein in a small amount of urine, the rate and volume of urine in the twenty-four hours will be entirely too low for the kidney to secrete all the day's urea.

He adds the observation also that in a so-called urea concentration test the amount of urine passed must be sufficient for the excretion of the urea administered before a definite conclusion can be drawn from the fact as far as the functional efficiency of the kidneys is concerned. He has some doubt also as to the use of any formula or index based on the excretion of urea. Therapeutically the author suggests that when the concentration ability of the kidney is low we carefully avoid passive congestion and body dehydration, so as to permit the kidneys to excrete as much water as possible, that we reduce the protein intake, avoid as much tissue destruction as possible, in order to lower the demands upon the nitrogen excreting function of the kidney.

F. J. HIRSCHBOECK.

THE VIBRATING SENSATION IN DISEASES OF THE NERVOUS SYSTEM—R. T. Williamson (Amer. Jour. of Med. Sc., Nov., 1922): The vibrating sensation is the peculiar vibrating or trembling sensation which is felt when the foot of a large vibrating tuning-fork is placed firmly in contact with a subcutaneous bony prominence or surface in many parts of the body—the malleoli or the styloid process of the ulna or the sternum for example. The sensation is also sometimes described as bone sensibility or pallesthesia.

In certain diseases of the nervous system affecting motor structure only the vibrating sensation is always felt. Thus I have never found it lost, even at an advanced stage of the disease, in cases of amyotrophic lateral sclerosis, primary lateral sclerosis, progressive muscular atrophy, acute and chronic anterior poliomyelitis (in the infant or adult) and paralysis agitans. Also I have never found it lost in pseudhypertrophic paralysis, idiopathic muscular atrophy, neurasthenia (unassociated with hysteria). Loss of the vibrating sensation would therefore be a strong point against the diagnosis of the affection just named.

The following common combinations of early signs of organic disease are quoted:

1. Loss of the vibrating sensation on the legs, slight incoordination, Babinski reflexes. (Later signs of ataxic paraplegia or combined posterolateral sclerosis or degeneration.)

2. Loss of the vibrating sensation on the legs or on the abdomen and legs or on the abdomen only. Babinski reflexes, loss of abdominal reflexes. (Later signs of disseminated sclerosis.)

3. Girdle pains, often for a long period; then loss of vibrating sensation on the legs, with Babinski reflexes. (Later signs of compression myelitis from tumor of the meninges or vertebræ.)

4. Loss of the vibrating sensation, loss of the tendo-Achillis reflexes, pain in the legs. (Later loss of knee-jerks and other symptoms of peripheral multiple neuritis.)

J. C. MICHAEL

ANEURYSM OF THE HEPATIC ARTERY—Julius Friedenwald and Karl H. Tannenbaum (Amer. Jour. of Med. Sc., January, 1923): Aneurysm of the hepatic artery is an exceedingly uncommon affection, of which a total of 65, the authors state, have been found in the literature. The authors have made a careful study of these 65 cases, have tabulated the clinical data, subjective and objective, the etiology, symptoms, immediate cause of death, and the post-mortem appearance.

They report in detail a case of their own, occurring in their clinic at Baltimore.

The size of the aneurysm varied from that of a barley-corn to a child's head. The extrahepatic type is usually larger than the intrahepatic, and also occurring in predominating numbers, in the proportion of about 3 to 1. Rupture of the aneurysmal sac occurred in 45 of the 65 cases, most commonly into the peritoneal cavity. The disease is more common in males than females, in the proportion of 3 to 1. The age range is from 14 to 83 years, the average age in the 63 cases being 38 years.

Infections play an important part in the etiology, particularly septic endocarditis, typhoid fever, pneumonia and osteomyelitis, with syphilis as a cause relatively infrequently. The most common symptoms are pain, which occurs in 70 per cent of the cases, and varies in intensity and character.

Hemorrhages occurred in 63 per cent. They are often massive, intermittent, recur at irregular intervals, and are usually the immediate cause of death. They take place into the abdominal cavity, into the bile ducts, or into the gastrointestinal tract.

Jaundice has been noted in 64 per cent of the cases, and may be temporary or permanent.

Fever has been noted in 32 per cent, and it may rise as high as 103° or 104°, and usually occurs with pain paroxysms and chills.

Tumor formation is quite characteristic and the mass frequently pulsates.

The diagnosis is exceedingly difficult, as evidenced by the fact that in but 2 cases of the 65 collected was the diagnosis correctly made during life except in those instances in which exploratory incisions were performed. Therapeutically surgery offers the only relief. Kehr was the first to perform an operation with recovery of his patient. Three patients had been operated on previous to this, with fatal results.

The consensus of opinion is that anastomoses of the hepatic artery in the liver tend to occur after a varying period as a result of the aneurysmal condition. This is essential to warrant ligation, with a reasonable hope of establishing a sufficient circulation to keep up the hepatic function. Since Kehr's operation in 1903, 9 others have been performed, with 3 recoveries.

F. J. HIRSCHBOECK.

THE TREATMENT OF NEURO-SYPHILIS—Sir James Purves-Stewart, Senior Physician to the Westminster Hospital (Brit. Med. Jour., Oct. 7, 1922): In this paper the English neurologist discusses comprehensively his general considerations, neuro-relapses, diagnosis, preventive treatment, neurotropic organisms or syphilotropic nervous tissues, varieties of syphilitic lesions in the central nervous system, treatment of the types of neurosyphilis, including the pyrexial; queries monkey serum, spinal drainage and intraspinal, intracisternal and intracranial methods. His conclusions are quoted:

1. Every case of neuro-syphilis, diagnostically established by combined clinical and serological tests, demands assiduous treatment of the general syphilitic infection by every means at our disposal. Antisyphilitic remedies, including mercury, iodides, arsenobenzol, etc., are to be administered by the most efficient route, whether by the mouth, by inunction or fumigation, by intramuscular injection, or by intravenous injection into the blood stream. In no case should our remedies be directed exclusively to the nervous system.

2. In gummatous and meningo-vascular neuro-syphilis the foregoing antisyphilitic treatment is usually all that is necessary.

3. Some cases of parenchymatous syphilis respond, but the majority are resistant, to general antisyphilitic treatment, even when carefully and thoroughly carried out. Such cases are those which should be selected for supplementary subarachnoid treatment, whether intrathecal or intracisternal.

4. Intraspinal treatment by salvarsanized serum prepared from the patient's own blood, or by human or horse serum mercurialized in vitro, is specially suitable for cases of tabes and of cerebro-syphilis, provided the cerebro-spinal fluid shows evidences of active meningeal reaction. It is also suitable for meningo-vascular spinal syphilis when resistant to ordinary treatment.

5. The direct intraspinal administration of arsenobenzol into the cerebro-spinal fluid is liable to produce acute softening of the spinal cord and should be discarded.

6. Cases of general paralysis, of optic tabes, of taboparalysis, and of tabes with negative reactions in the cerebro-spinal fluid, are not likely to benefit by intraspinal treatment.

7. Cases of meningo-vascular cerebral syphilis benefit much by intracisternal administration of salvarsanized serum.

8. General paralysis, if recognized in the early stage, is definitely benefited by intracisternal treatment. This method is superior in efficacy to intraventricular operations and entails much less risk to the patient.

9. Pyrexial treatment of early general paralysis—for example, by tuberculin, nuclein, etc.,—may induce temporary remissions in the disease. So also can simple drainage of the cerebro-spinal fluid, combined with general antisyphilitic treatment.

10. Advanced cases of general paralysis, with extensive destruction of cortical nerve elements, are hopeless for curative treatment by any method whatever.

J. C. MICHAEL.

SURGERY

SUPERVISORS:

E. MENDELSSOHN JONES,
LOWRY BLDG., ST. PAUL

VERNE C. HUNT,
MAYO CLINIC, ROCHESTER

TREATMENT OF DIVERTICULI OF THE OESOPHAGUS—C. H. Mayo (Ann. of Surg., vol. 77, p. 267): As treatment for diverticuli of the oesphagus, Bell in 1830 suggested and made an external fistula into the sac. Rokitansky in 1840 described and classified diverticuli of the oesphagus into two types—pulsion and traction diverticuli—which is still used as a pathological basis. It is a disease of adult life and more common than generally realized. The pulsion diverticuli are pushed out from within by violent peristaltic action at the narrowest part of the canal behind the cricoid. The traction type are small and are situated at about the level of the bifurcation of the trachea, and are usually caused by suppuration of the glands. They are rare, being found most often at post mortem and seldom cause clinical symptoms. All pulsion type of diverticuli eventually become surgical on account of increase in the severity of symptoms.

Once the oesphageal muscle is penetrated, the sac gradually enlarges and develops a semi-inflammatory or traumatic thickening of the fibrous coat. While at first in the mid line growing down in front of the spine, they bulge to the sides, usually tending to become larger on the left. The

use of silk thread, first suggested by Mixter of Boston, has been greatly developed by Plummer as a means of a guide in dilating strictures of the œsophagus. Plummer also suggested the use of this thread as a means of estimating the depth of the sac of the diverticuli. The sacs give trouble even when small, but as they become larger, owing to their interference with swallowing they give rise to great emaciation. The author advises the use of local anesthesia in the surgical treatment of these cases, and advises the two stage operation as a safer method, thus avoiding cellulitis and mediastinitis. He reports 82 cases with 3 deaths, with no deaths in the last 30 cases. In the surgical treatment, the sac is easily distinguished because of its lighter color than the surrounding tissues, and because of the small plexus of veins over it. Blunt dissection of the sac has been found the most practical, and experience has shown that the larger intrathoracic sacs should be pulled up before ligature of the pedicle is attempted.

J. P. BOWLER.

INGUINAL HERNIA IN THE MALE—Seward Erdman (Ann. of Surg., vol. 77, p. 171): Erdman, from the New York Hospital, reports 1,093 elective operations for inguinal hernia, of which 52 recurred, or 16.61 per cent; giving a by personal re-examination at the hospital by members of the attending staff which the author emphasizes as essential to an accurate survey of post-operative results. Comprising this number were 665 cases of oblique hernia of which 21 recurred, or 3.15 per cent; 313 cases of direct hernia, of which 52 recurred, or 16.61 per cent; giving a total recurrence of 73 cases, or an average recurrence of 7.46 per cent. Of these cases, 98.6 per cent had recurred within a period of two years, the author concluding that any hernia which had not shown evidence of recurrence within this period could be considered as permanently cured. The operative mortality was 0.32 per cent.

Bilateral hernia occurred once in every four cases; oblique hernia was bilateral in 26 per cent; direct hernia was bilateral in 69.5 per cent; the direct-indirect type was bilateral in 63.4 per cent. In the follow-up of 849 cases, the incidence of bilateral hernia was shown to be 37.4 per cent, including those patients showing hernia on the opposite side at the time of re-examination.

The average age for the direct hernia was 38 years; for the direct-indirect, 38.5 years; and for the oblique hernia, 27.8 years. On a basis of the age incidence, he agrees with Hamilton Russell's theory of the congenital origin of indirect hernia. The Bassinni operation is regarded as that of the greatest general application, and the operation of choice in patients over 20 years of age. He believes the Ferguson method the better for younger patients.

The direct-indirect hernia is discussed as a distinct type, and defined as one in which the sac bulges on both sides of the deep epigastric vessels, that on the medial side usually being the larger. Erdman believes that these are really direct herniæ which have extended laterally, because (1) of the age of the patients in which they occur, (2) they are bilateral in 60 per cent of the cases, (3) if there is a hernia on the opposite side, it is generally direct, (4) they recur in 14 per cent of cases, and the type of repair is essentially the same as the direct type.

A common finding with hernia was a bulging of the muscles of the inguinal region, termed the "Pool bulge." This was seen as a bulge of the muscles parallel to and above Poupart's ligament extending outwards from the lateral border of the rectus towards the crest of the ileum. This was suggested as a muscular weakness, and as such, a possible factor in the production of acquired and also congenital hernia.

From a review of the types of recurrence, it seemed that the vast majority of herniae recurred in their primary type, and that the method of secondary repair played but little part in the incidence of secondary recurrence. Appendectomy through hernia incision was found to be inadvisable on account of the danger of hemorrhage and infection through inadequate exposure.

Scrotal tumefactions following herniotomy occurred in 48 per cent of the oblique type and 15.2 per cent of the direct type. The period of duration averaged three months, usually followed by spontaneous recovery, and such tumefactions were not considered to be a serious complication of herniotomy. Wound infection occurred as a certain cause of recurrence.

J. P. BOWLER.

GYNECOLOGY AND OBSTETRICS

SUPERVISORS:
ARCHIBALD L. McDONALD,
FIDELITY BLDG., DULUTH
ALBERT G. SCHULZE,
LOWRY BLDG., ST. PAUL

PREGNANCY IN THE TUBERCULOUS, WITH REPORT OF 166 CASES—Chas. C. Norris and Douglas P. Murphy (Amer. Jour. of Ob. and Gyn., Dec., 1922): The authors base their report upon a series of 166 cases. In every case the tubercle bacilli were definitely demonstrated and each case was followed at least 3 months after labor, some longer. Of the 166 cases of pregnant women with pulmonary tuberculosis, 68 were in the first stage of their pulmonary disease, 79 in the second stage and 19 in the third stage. Of the 68 presenting signs of tuberculosis in the first stage 18 were improved 3 months after labor, 29 showed no change, 20 cases were considered to be worse and 1 had died. Of the 79 second stage tuberculous, 3 months after labor 11 had improved, 35 showed no change, 34 were worse and 3 were dead. Three months after labor in the 19 third stage cases, 1 improved, 2 were stationary, 10 were worse and 6 dead. In the 166 cases therapeutic abortion was done 7 times, spontaneous premature labor occurred 4 times and spontaneous abortion (miscarriage) 6 times. Four infants were stillborn, 28 were dead and 120 were alive at the end of 3 months. The infant mortality was 18 per cent. The maternal mortality was 6 per cent. In 166 cases of pregnancy complicated by pulmonary tuberculosis in all stages 38 per cent were definitely made worse, 37 per cent exhibited no change, and 18 per cent were improved 3 months after labor.

From the study of these cases the authors emphasize individualizing the patient. Generally speaking, laryngeal involvement, hemorrhage, night sweats, loss of weight, lack of vigor are ill omens. Prior to the fifth month in cases indicating activity of the disease, they advise emptying the uterus. After the fifth month expectant treatment is advised.

F. C. GREAVES.

IS INTERFERENCE JUSTIFIABLE AFTER TWENTY-FOUR HOURS OF LABOR WHEN NO OTHER INDICATION IS PRESENT—Alfred C. Beck, M.D. (Amer. Jour. of Ob. and Gyn., Dec., 1922): The sense of security afforded by using the two-flap low cesarean section following a test of labor, has prompted Beck to resort to a more thorough test of labor when relative disproportion exists. Accordingly he abandoned the old procedures advised as prophylaxis against prolonged and difficult labors. The size of the child, the danger of allowing a pregnancy to continue overtime were disregarded. Occiputs-posteriors were treated expectantly and no dilatation was done in dry labors. No interference was attempted until there had been at least two hours of good hard second stage pains. Care was taken to avoid fatigue. As soon as the graphic record showed a weakening in the strength or in the frequency of the uterine contractions, morphine in sufficient amounts to stop labor was given and the patient was allowed to sleep. If, upon rupture of the membranes, the cervix was almost dilated a snug abdominal binder was adjusted and voluntary efforts encouraged. In 1,138 service cases 79 were prolonged labors. In the 79 cases there were 3 stillbirths, 3 deaths of infants under 14 days and 1 maternal death. In the 1,138 cases there were 21 stillbirths, 21 deaths of infants under 14 days and 2 maternal deaths.

F. C. GREAVES.

ROENTGENOLOGY

SUPERVISORS:
C. U. DESJARDINS,
MAYO CLINIC, ROCHESTER
R. G. ALLISON,
SYNDICATE BLDG., MINNEAPOLIS

RESULTS IN THE TREATMENT OF TUBERCULOUS LYMPHADENITIS BY *X*-RAYS AT LUND, FROM 1908 TO 1918—Institute of Radiology at the University of Lund, Sweden, Hans Edling (Acta Radiologica, Vol. I, Fasc. IV, p. 455, Aug., 1922): At the commencement of the period indicated, surgery was the generally accepted form of local treatment of tuberculous lymphadenitis; radical extirpation being favored in contrast to conservative interventions such as curettage, puncture with injection of antiseptics such as emulsion of iodoform-zinc chloride, etc. In 1908, operations on tuberculous glands made up 7 per cent of our total operations at Lund—a number exceeded only by operations on the appendix and for hernias. In 1918, the number had fallen to about 1 per cent, due to the rapid development of radiotherapy in this field.

The method of treatment first used at Lund was a modification of the technique of Kienbock (called the expeditive method). An ordinary diagnostic tube with about 12-15 cm. parallel spark-gap and a focal distance of 24 cm. was used with leather, rubber or tinfoil filtration. The doses were calibrated by the Sabouraud radiometer. In cases of adenitis, heavy doses were never used, a superficial dose of 2-4 H. being given as a rule and repeated at intervals of 1 week to 15 days. All the involved areas were exposed at one sitting and only in very large tumors was the cross-fire method, recommended by Kienbock, employed. The methods of reducing skin sensitiveness by pressure anemia, according to the method of G. Schwartz and advocated by many authors, or of provoking a hyperemia in the glands by means of diathermy or Bier's stasis, were not employed.

In 1913 the idea of deep therapy was introduced by the school of Freibourg. By 1915 the author, after gradually modifying his methods in conformity with their views, adopted the technique which he has used since then. Filtration was increased to 3 or even 4 mm. al, with a secondary filter of cotton or leather. The focal distance of the tube was reduced to 18-20 cm. Relatively moderate doses have always been used in the treatment of lymphomas —only rarely surpassing 5 H. units for adults, for infants usually 2 or 3 H. Disson of Heidelberg is using, with a filter of ½ mm. zn. and a spark gap of 35-45 cm., doses similar to those used in malignant conditions. With 3 mm. al. he recommends doses of 30 to 40 H. and claims complete disappearance of even old resistant masses with fistulæ. Similar results are reported by Rapp with doses a little more moderate. Since this work has been only recently undertaken, it has seemed wiser to await later results of this technique.

The possibility of therapeutic results with *x*-rays depends on the fact that the lymphatic tissue and granulation tissue characteristic of tuberculosis are more susceptible to roentgen rays than the skin and subcutaneous tissue. Even caseous masses according to Isetin can be reabsorbed slowly. As shown by Krall, the bacteria within the tumor are unaffected. This fact accounts for recurrences in cases apparently entirely healed. As a rule the bacteria are rendered innocuous through the alteration of conditions necessary for their growth. During the treatments, due to an indirect action upon the organism, a general amelioration of condition is usually experienced, provided the body has not previously been enfeebled to a stage of being unable to react, as from a coexisting pulmonary tuberculosis, in which cases local treatment of a lymphadenitis is useless.

The author divides his cases according to three stages of the disease. In the first stage one finds simple hyperplasia of the node; in the second stage there are large matted plaques of glands with periadenitis. The third stage is characterized by suppuration and fistulæ and finally extension to the skin.

The average length of treatment in the first group has been 6½ months—in the second group, 8 months. In the third group radiotherapy is usually combined with minor surgical procedure, as aspiration through healthy skin where suppuration is imminent, or, where a fistulous tract exists, repeated curettage. The wounds after irradiation usually heal quickly, and the resulting scars compare favorably with scars following surgical procedure alone.

This group of cases, which is acknowledged the most difficult type of case from a surgical standpoint, shows with radiotherapy the greatest percentage of cures. The average length of treatment has been 8 to 10 months. The results of treatment are shown in the following table:

	Total Cases	Healed	Improved	Recurrent	Dead
Group 1..	70	49 or 70 %	14 or 20 %	3 or 4.3%	4 or 5.7%
Group 2..	32	18 or 56.2%	9 or 28 %	2 or 6.2%	3 or 9.4%
Group 3..	104	88 or 84.6%	6 or 5.8%	9 or 8.6%	1 or 1 %

In comparing these results with those of surgical treatment, the statistics of Blos at Heidelberg based on 745 cases from 11 Clinics were used. After 6 years there were 54 per cent of cures, 28 per cent of recurring cases and 18 per cent of deaths. In the years 1909 to 1914 when radiotherapy was characterized by poor technique and irregular treatment, the cases so treated show 77 per cent definite cures, 20 per cent of cases improved and 30 per cent deaths. Radiotherapy, however, is not without its peculiar risks experienced in the occurrence of secondary skin lesions from over-exposure. The long duration of the treatment is a disadvantage, although the average patient may continue at his occupation during the same time. In conclusion the author refers to the experience of the Danish Clinics where baths of electric lights are combined with *x*-ray therapy with very beneficial results.

A. U. DESJARDINS.

RESULTS IN THE TREATMENT OF HEMORRHAGES AT THE MENOPAUSE WITH RADIOTHERAPY AT THE CLINIC OF RADIUM—James Heyman, Clinic de Radium of Stockholm (Acta Radiologica, Vol. I, fasc. 4, page 470, 1922): In many fields of gynecology, radiotherapy has had a revolutionary effect; in none, more than in the treatment of hemorrhages at the menopause. The preeminent place of radiotherapy in the treatment of these hemorrhagic conditions is generally admitted, but there is still some discussion in regard to questions of technique or whether radium or *x*-rays give the best results.

The cases, here reported, were treated with radium only; the number treated by *x*-rays is still too limited for comparison. Of 57 cases treated between 1916 and 1920, 86.5 per cent have been over 40 years of age. The remaining 7 (13.5 per cent) were, with one exception, between 35 and 40 years.

Five cases have not been seen subsequently. Of the 52 remaining cases—40 had previously submitted to curettement, 21 having had 2 or 3 or even 4 curettements and continued to bleed after the treatment. Six of the remaining 12 were treated medically with varying periods of rest in bed. In six cases no previous treatment had been given. The results of the treatment in the 52 cases were:

Amenorrhea in	32 cases	92.2%
Oligomenorrhea in	16 cases	
Failures in	4 cases	7.7%

Among the four cases reported as failures, one was found to be a hemophilia. A second was treated vigorously as though for cancer, because of a suspicious curettement, with good results. A third was operated for a cystic ovary. In the fourth case after two radium treatments and a year of oligomenorrhea, renewed and severe hemorrhage necessitated abdominal hysterectomy. Concerning the number of treatments:

42 cases received 1 treatment	80.8%
8 cases received 2 treatments	15.4%
2 cases received 3 treatments	3.8%

We have used two different methods of treatment, the first being the intrauterine application, with strict asepsis, introducing three tubes of radium (40 mgr. Ra. Br.—19 mgr. Ra. element) in tandem in a rubber container into the uterus, with dilatation when required. The tubes, the walls of which correspond to 1 mm. of lead filter, remained in place 16 to 20 hours (304-380 mgr. hours. Ra. element).

In the second method of vaginal application, the filter was of 3 mm. Pb. and the dose increased (1100 to 1700 mgr. hours. Ra. element).

The results of the two methods have been almost identical. Neither method has provoked any complications. When dilatation was required, the intrauterine application caused the patient more pain. This was too slight, however, to give either method absolute preference. The possibility of giving a more exact dosage, offered by the intrauterine method, seemed to the author the essential point in its favor. It is certain that the distance from the center of the cavity of the uterus to the ovaries is more constant than from the cul-de-sac of the vagina to the ovaries. On theoretical grounds, it has been thought that *x*-rays permit more exact measurement of a castration dose because of less variable factors. The author does not agree with this point of view and considers radium therapy, from the point of view of technique, so simple and sufficiently exact in its results as to compare favorably with *x*-ray treatments.

By either method we should be able to assure the patient relief from the hemorrhages, and the symptoms of the artificial menopause following are not more severe than those of the physiological menopause.

A. U. DESJARDINS.

THE ROENTGEN TREATMENT OF BRAIN TUMORS—S. Nordentoft (Acta Radiologica, Stockholm, Sweden, Aug., 1922, Vol. 1, fasc. 4, No. 4, page 418): This is a report on the subsequent progress of 18 previously reported cases. Not more than half of the patients treated were still living at the end of 4 years. In 7 cases roentgen treatment was without effect or only partially effective, and these patients have all died. In 2 the diagnosis was doubtful and future developments showed that they were not tumors. Of the 9 surviving cases one is omitted because of doubtful diagnosis. The remaining 8 cases are all living from 3½ to 6½ years following treatment, essentially in the same condition as first reported, and no recurrence has taken place.

The evaluation of radiotherapy in this extremely serious condition is difficult, because it will never be possible in a single case to definitely prove that it really was a case of brain tumor cured by the roentgen rays. The reason for this lies in the imperfection of neurological diagnosis. In neurological language the conception of tumor means a localized, space-filling something of a different nature within the cranium, and this may be a solitary tubercle, cystercus, a cyst, a meningitis serosa or a tumor. As a result of this uncertainty the percentage of cures in treated cases will be

considerably reduced beforehand owing to the inclusion of the above conditions among the cases diagnosed tumor cerebri. On the contrary, when a cure is obtained, it constitutes strong, probable proof that there really had been a tumor present, since scarcely any of the above mentioned diseases are influenced by roentgen treatment.

As may be inferred from the above-mentioned facts, not every case of tumor cerebri subjected to roentgen treatment can be cured, and in the favorably influenced cases there will be at times surviving defects, corresponding to such important centers or conduction paths as have been definitely destroyed by the tumor. Since the 8 cases originally reported have progressed so favorably and are still well, it seems as if, in this respect, brain tumors behave much like sarcoma, namely, that when sarcoma has once disappeared, it has not the tendency to recur that cancer has. There is no reason why brain tumors should not offer just as good a field for radiotherapy as malignant tumors elsewhere, particularly since they often seem to belong to those forms that respond well to radiation treatment.

A. U. DESJARDINS.

MEANS OF REDUCING THE SECONDARY RADIATION IN ROENTGEN DIAGNOSIS—Ake Akerland (Acta Radiologica, Aug., 1922, Vol. I, fasc. 4, page 486): In order to reduce secondary radiation from the body when submitted to roentgen examination, Buckey introduced in 1912 and 1913 a screening device, which consisted of a squared network of interlacing lead bands placed in line with the path of the rays and converging toward their focus. While effectively reducing the indistinctness due to secondary rays, the screen has the disadvantage of leaving a shadow of the network of lead bands. To avoid this Lotzin suggested several years later a moving screen, but his device apparently was not developed commercially.

Potter of Chicago added many alterations and improvements to the Buckey screen. He showed that no linear, circular or irregularly moving screen of squared mesh could entirely suppress the disturbing net shadow, and substituted a diaphragm of parallel plates or metal strips, which together form a section of a cylinder of about 60 to 70 cm. radius. The plates are placed in line with the rays and converge toward the focal point. During an examination the screen is kept in slow uniform motion about the axis of the cylinder. The Buckey-Potter screen brought about great improvement in the quality of roentgenograms, especially those of the thicker portions of the body. In spite of its many excellent features it has certain disadvantages, e.g., some of the secondary radiation which courses in the plane of the parallel plates is not eliminated; the distance between the object and the plate is great; the apparatus is clumsy and must be used on a special examining table.

In planning a new screen, the author has adopted a flat circular form as requiring the least space. All intersections or interruptions of lead bands must be avoided to secure uniform illumination of the plate. It is evident, then, that the screen must be constructed in the form of a spiral. The device adopted consists of four spirals arising at the center, where they are perpendicular to the plane of the screen, gradually inclining toward the horizontal as they approach the periphery. The four spirals must be exactly centered and are revolved about this center as an axis of rotation. The screen is manufactured by Jarnh (Stockholm) and a patent has been applied for. In investigating foreign patent rights, the author found that other spiral screen devices had been registered but apparently are not being manufactured nor are they reported in medical roentgen literature.

Werner (Berlin) has two screens, one of a single spiral reinforced by partitions placed radially between neighboring spiral windings; the other having an independent starformed screen in conjunction with the spiral. Caldwell (New York) used several spirals, but placed their center of rotation away from the center of the plane. All these conditions cause the appearance of screen shadows.

A. U. DESJARDINS.

PEDIATRICS

SUPERVISORS:
FREDERICK C. RODDA,
CHILDREN'S CLINIC, MINNEAPOLIS
ROY N. ANDREWS,
MANKATO CLINIC, MANKATO

CHRONIC INTESTINAL INDIGESTION DURING THE SECOND AND THIRD YEARS OF CHILDHOOD—Lewis Webb Hill (Boston Med. & Surg. Jour., Nov. 30, 1922): This paper is of interest as presenting the viewpoint of the older Boston School.

"Hill's practice in feeding is to begin semisolid food such as oatmeal, farina or zwieback at the eighth or ninth month, with chicken or lamb broth and rice, and apple sauce for constipation. At the end of the first year the child should be taking a quart of whole milk a day, cereal twice a day, soup, orange juice, and apple sauce; and at the fourteenth month, strained vegetables and potato are added. Soft boiled eggs are begun at 16 months, and meat at 2 years.

"For practical purposes, chronic intestinal indigestion may be divided into 2 groups—mild cases, and severe ones. The symptoms and signs of the mild cases are failure to gain, poor color, undigested stools, and abdominal discomfort, with underweight, pallor and prominent abdomen. The trouble is usually due to overfeeding with either starch or fat. In starch cases, the stools are large, mushy, brown, and foul or sour, while in fat cases they are smaller, paler and not foul. On microscopic examination of the stools, the slightest amount of undigested starch is abnormal, while there is normally a not inconsiderable amount of fat present. A study of the diet of the child is very important. The treatment consists simply in reducing the amount of the offending element in the diet. In mild fat cases, it is usually sufficient to omit cream, butter and bacon from the diet. In starch cases potato must be withdrawn, and green vegetables restricted. Rice, jelly, crisp toast, or zwieback may be given. The rest of the diet will consist of milk, eggs and meat. In severe cases, the process is of such duration and severity that serious nutritional damage has resulted. There is extreme impairment of nutri-

tion, with large abdomen, haggard face, loose, inelastic skin, frail and weak extremities; and the stools vary, containing undigested starch and cellulose, or fats, often with a large amount of mucus, and a foul smell. Perhaps the best conception of the cause is that it is brought about by a chronic infection of the contents of the intestine, by organisms which should not be there. This bacterial population lives on the food, and the irritating products set up a chronic inflammatory condition in the mucosa, which hinders digestion and absorption. Therapy consists in reducing or entirely eliminating from the diet the foods or food upon which the microorganisms thrive. Protein is well tolerated, a moderate amount of sugar also, but starch, hardly ever. Fat-free milk forms the basis of the diet, 48 or more ounces per day. Sugar may be given in the form of corn syrup; protein is given in meat, cottage cheese, and casein muffins. The best starch to add is rice jelly or zwieback, and fat is added by giving small amounts of whole milk. Fat-soluble vitamins are given in spinach, egg yolk, or cod-liver oil; and the water-soluble vitamins are contained in the milk given."

It would appear that Hill does not conceive of chronic intestinal indigestion as due to digestive incapacity.

ROOD TAYLOR.

CELIAC DISEASE—Rood Taylor (Amer. Jour. of Dis. of Child., January, 1923): Samuel Gee described celiac disease in 1888. It has never been recognized in a breast-fed infant. In its typical form it is always chronic. The children suffering with it are undersize and underweight. The abdomen is distended. The stools are voluminous, gray, greenish or brown, containing much mucus and at times being liquid. They are usually foul and rancid. The rate of metabolism is slightly diminished. There is usually some degree of anemia and the spleen is moderately enlarged. The mental ability of these children is usually far in advance of their physical powers. The most frequent complications are scurvy, tetany, edema and purpura. The necropsy in two typical cases showed no change which could in any way account for the symptoms present. It is thought that the disease results from infection either of the bowel contents or of the intestine with the resultant defect in absorption. Other hypotheses include chronic infection, deficient or defective pancreatic secretion, bile or vitamin deficiency.

In the study of these cases, it would seem that the best way to produce the disease is to feed a susceptible child throughout his second year on a diet rich in milk, fat and potato, and then to subject him to some parenteral infection. The roentgen ray in every case showed a dilated atonic colon. The livers were uniformly small. Free hydrochloric acid was absent in several cases in which the stomach contents were examined.

Up until one year ago, the basis of our diet in these cases was protein milk to which other foods were gradually added. For the past year the author has begun treatment with a solution of Karo corn syrup flavored with orange juice. This was continued for two or three days and then skimmed lactic acid milk to which was added the curd of an equal quantity of skimmed milk, and to this was added 7 per cent of Karo corn syrup. The initial improvement was striking; the skin became pink instead of sallow and immediate gain in weight was noticed, and the child improved in every way. These children tolerate more soluble carbohydrate on this diet than they do on the protein milk, following such foods as scraped lean beef, gelatin, flourball porridge, toast, powdered spinach, emulsified cod liver oil, cream and egg yolk were used. Orange and lemon juice was found essential in the dietary treatment.

R. N. ANDREWS.

THE INFLUENCE OF ATROPIN ON THE STOMACH OF INFANTS, WITH SPECIAL REFERENCE TO PYLOROSPASM—Adolph Salomon (Monatschr. f. Kinderhlk., Leipsic, Oct., 1922): The author endeavored to ascertain what cases are amenable to atropin treatment. He first examined the effects of atropin on the stomach of six normal infants, ranging in age from three weeks to three months. The motility of the stomach was first studied by complete evacuation with the stomach tube, and afterwards also with the fluoroscope. Evidence is presented in tabular form that gastric evacuation is retarded after the administration of atropin. Atropin treatment for 24 hours did not decrease the secretion of hydrochloric acid in normal infants. Roentgenoscopically it was found that the tonus of the stomach is considerably decreased after the administration of atropin; the stomach dilates. Peristalsis is slower, and the contractions in the antrum are more superficial. No influence was observed on the pylorus. The favorable results obtained in treating pylorospasm must be interpreted as due to the effect on the gastric musculature and not on the pylorus. In cases which respond to this treatment, the pyloric stenosis seems to be of secondary significance, the principal rôle being played by gastric hypertonia, gastrospasm (Thomsen). Large doses of atropin also proved effective in habitual vomiting in neurophatic infants. In one child, 2½ months old, in whom every change of food produced no beneficial effect, a dose of atropin before every bottle stopped vomiting almost completely. When atropin was discontinued after 11 days, vomiting again became intense and frequent, resulting in loss of weight. The vomiting attacks were probably stopped by decreasing the tonus of the wall of the stomach, analogous to observations in pylorospasm. The effect of cocain is to anesthetize the hypersensitive mucous membrane of the stomach; atropin inhibits not only the stimuli starting from the stomach, but also those which may be caused by hyperexcitability of the vagus and by the act of deglutition. Atropin, therefore, has more numerous indications than cocain.

ROOD TAYLOR.

THE TREATMENT OF FLAT WARTS BY THE INTERNAL ADMINISTRATION OF MERCURY—Howard Fox (Amer. Jour., of Dis. of Child., January, 1923): The suggestion of treating flat warts by internal administration of mercury was first made by Dr. Charles J. White in 1915. This treatment was tried on the supposition that warts were caused by some as yet undiscovered protozoon. The author's experience has been confined to eleven cases. The result was entirely satisfactory in five cases and in these the disappearance of the eruption was absolutely complete in from three to eight weeks. There had been no return

of the disease in these patients at the end of three, four, five and seven months and three years, repectively. The treatment consisted solely of the internal administration of mercurous iodid tablets in doses of one-fourth grain, three times a day. Smaller doses were given the younger patients. No local remedies whatever were employed.

The disease in question is often spoken of as verruca plana juvenilis. It generally appears on the face and hands, and in men is apt to affect the bearded region. The eruption consists of flat, pinhead sized, or larger, flesh colored, or slightly pinkish yellow, more or less polygonal papules.

From the author's limited experience, there seems to be no doubt that in a certain proportion of cases of flat warts, successful results can be obtained by such a simple procedure as the administration of mercury by mouth for a few weeks. This method of treatment is comparable to the effects of radiation on common warts (verruca vulgaris). At times the results of radium or roentgen-ray treatment are brilliant, at other times they are entirely unsuccessful. Flat warts can always be removed by the curet, a method, however, which is not an agreeable one, especially for the average child or young woman. It is also well known that various types of warts may suddenly disappear spontaneously. As the mercury treatment is such a simple one, even though it often fails, it would seem rational to give it a trial before resorting to other less agreeable methods.

R. N. ANDREWS.

THE RELATION BETWEEN BREAST AND ARTIFICIAL FEEDING AND INFANT MORTALITY—Robert M. Woodbury (Am. Jour. Hyg., Nov., 1922): In the course of studies of infant mortality made in eight American cities, the Children's Bureau obtained information for a large number of infants, including in each case a record of the feeding received in each month of life for the first year. An analysis of the influence of feeding is made upon data for 22,422 live-born infants in these eight cities. The infants are classified according to the feeding received during each month of the first year of life. Such a classification yields a statement of the total number of months lived by infants receiving each type of feeding, and permits taking into account the change in the mortality rate by age, and comparing for each month during the first year of life the relative mortality among infants receiving each type of feeding. The kinds of feeding are classified into three groups, exclusively breast, exclusively artificial, and partly breast and partly artificial feeding. The analysis has shown that artificial feeding, as actually practiced in typical city populations, is associated with a mortality between three and four times as high as the mortality among breast fed infants. This excess mortality is not to be explained by the slight overweighing of the group of artificially fed with infants in certain groups characterized by high mortality rates; and it appears in all nationalities and in all earning groups, though with variations depending probably upon the particular conditions prevailing in the groups.

ROOD TAYLOR.

THE NEW-BORN CHILD—Herzfeld (Arch. of Ped., November, 1922): The author discusses the peculiarities of the newly-born in respect to weight, temperature and jaundice. His experiences at Riga have convinced him that if there is any period of asphyxia during the expulsion stage, so that the child swallows the mixed vaginal and amniotic fluids, jaundice almost inevitably follows. Decomposition of the lochia is always noted in cases of this kind, although the woman may not show any other signs of morbidity. The vaginal bacteria are not virulent enough to affect the mother, but they induce jaundice when swallowed by the infant; there is almost always slight fever with the jaundice. He treats the infant with jaundice, therefore, with systematic purging and reduces the intake of breast milk, shortening the feedings and allowing only four instead of five. This explanation of icterus neonatorum as a "swallowing jaundice" throws light on the larger proportion of cases among the first-born. It also emphasizes the necessity for clearing out the mouth at once to prevent the swallowing; omitting this, he has had jaundice develop unfailingly. He clears out the mouth by aspiration with a soft catheter, warning against the danger of injuring the mucosa when the mouth is swabbed out with cloth and finger. This does not clear it completely, even at the best. He reiterates in conclusion that the liver is not to blame for icterus neonatorum, and that the more skillful the management of the delivery, the rarer the icterus.

R. N. ANDREWS.

THE FREQUENCY OF HYPOGALACTIA—Walter Kahn (Deutsch. med. Wchnschr. Leipsic, Oct. 27, 1922): In studies of the nursing capacity of 130 mothers who were admitted to a mothers' and infants' home, and kept under close medical observation, 106 were tested at the end of the eighth week of nursing for the quantity of breast milk. Amounts under 700 gm., were regarded as insufficient. Only 51 mothers (48.1 per cent) yielded enough; 55 (51.9 per cent) did not produce enough milk and in 26 the secretion was much below normal (less than 500 gm.). After 12 weeks there was no marked change, only two women having improved (to over 1,500 gm.).

ROOD TAYLOR.

A CASE OF RENAL DWARFISM WITH BONY CHANGES—D. Paterson (Brit. Jour., Child. Dis., vol. 18, p. 186-188): Paterson's case was of the type known as chronic interstitial nephritis of childhood. In common with the usual case, the principal symptoms were excessive thirst and dwarfism. The unusual feature was the presence of marked bone pathology. There was osteoporosis, enlargements and subluxations of the wrist, and knee joints, and bowing of the femorae. These bony deformities had been present from birth on. Curiously enough Paterson had formerly observed similar deformities in another case of infantile nephritis. In the other case, however, these deformities were first noticed at the age of one year.

ROOD TAYLOR.

THE TOLERANCE OF CHILDREN FOR DIGITALIS—Hugh McCulloch and Wayne A. Rupe (Southern Med. Jour., May, 1922).

This paper is the report of two years' clinical and experimental work. The writers conclude that the method of administering massive doses of digitalis to children should be the same in detail as for adults. The use of massive doses for children is entirely practical, and under proper supervision possesses no source of danger. The amount of digitalis necessary to produce clinical improvement coincides with the amount necessary to produce vomiting and a fall in heart rate. These two phenomena may be taken as criteria that an optimum therapeutic effect has been obtained. Children with heart disease require an amount of digitalis per kilo of body weight which is about 50 per cent greater than would be required for adults.

There are two indications for the use of digitalis in children: (1) those who are suffering from heart disease and who are in a state of chronic cardiac failure; and (2) those who have a regular rapid heart rate when that heart rate cannot be slowed by other measures. Massive doses of digitalis are contraindicated in two groups of children with heart disease: (1) those who have an acute infectious or toxic myocarditis; and (2) those who are suffering from acute cardiac failure with overloaded hearts.

ROOD TAYLOR.

EXPERIMENTAL RICKETS IN RATS—A. F. Hess, L. J. Unger and A. M. Pappenheimer (Jour. Exp. Med., vol., 36, p. 427-446): These experiments showed that rickets producing diets would not cause rickets in rats in the summer if they were exposed to the sun's rays for fifteen minutes daily. Sun rays in the winter required longer than fifteen minutes. The effective sun rays did not penetrate window glass.

Irradiation of a few minutes with the rays of the mercury-vapor lamp suffices to protect rats against rickets. The length of time needed for protection was shorter with mercury-vapor lamp than for the sun's rays. Pigmentation of the skin lessens the effect of the rays.

ROOD TAYLOR.

A NOTE ON THE SECRETION OF THE CAUSATION OF POSTURAL OR ORTHOSTATIC ALBUMINURIA—F. Parkes Weber (Brit. Jour., Child. Dis., vol. 19, p. 81-84): Orthostatic Albuminuria is most frequently connected with the tall lanky type in which visceroptosis is apt to occur. Lordosis is frequently present. It may occur even after the thirty-fifth year. Parkes Weber offers additional evidence that the cause of this type of albuminuria is a disturbance of circulation causing congestion of the kidney. This may be brought about by pressure on the renal veins, by circulatory disease itself, or by the pressure of enlarged neighboring viscera as the spleen. Parkes Weber also reports two instances of orthostatic albuminuria in patients with congenital heart disease.

ROOD TAYLOR.

A CASE OF MORBILLI BULLOSI—E. Morton (Brit. Jour., Child. Dis., vol., 18, p. 188-191): This name is given to a disease in which an eruption resembling pemphigus is combined with the ordinary rash of measles. Morton's patient gave a history of precedent measles. On the fourth day of the illness, a rash appeared similar to that of measles except that the lesions were raised more than is usual in measles. Twenty-four hours later a bullous eruption developed, beginning on the chest; but rapidly spreading in fresh crops to other parts of the body. In another twenty-four hours the patient was dead.

The writer argues the question as to whether he was dealing with a bullous form of measles or with a combination of measles and pemphigus.

ROOD TAYLOR.

CLASSIFIED ADVERTISEMENTS

YOUNG MAN, for seventeen months engaged in a clinical laboratory, desires position in clinic or hospital in the Northwest. Able to do all routine laboratory work. Over two years' University training. Address B-53, care of MINNESOTA MEDICINE.

DENTIST WANTED. In a flourishing southern Minnesota village. Ideal location. Should be a gold mine for the right party. Share office rooms with physician. Address B-54, care of MINNESOTA MEDICINE.

FOR RENT—Doctor's office, six-room apartment over drug store, Crocus Hill district, St. Paul. Suitable for combination office and residence. Address B50, care of MINNESOTA MEDICINE.

WANTED—House physician. Single man having just completed internship preferred. Must be familiar with *x*-ray technique. Salary, $2,000.00 per year with full maintenance. Excellent opportunity for advancement to right party. Mudcura Sanitarium, Shakopee, Minn.

FOR SALE—One of the best paying private sanitariums in the United States. Located in Wisconsin. Principally nervous cases. Interesting and profitable business for one physician or staff. Capacity, 50 patients. Cost $225,000.00—$50,000.00 cash. Present owner will remain six months. Address B51, care of MINNESOTA MEDICINE.

FOR SALE—A complete physician's office outfit with electric apparatus. Call at 821 Lowry Bldg., St. Paul, Minn.

Minnesota State Medical Association Roster 1923

OFFICERS AND COMMITTEES

PRESIDENT
E. STARR JUDD, M. D. ..... Rochester

FIRST VICE PRESIDENT
E. BRATRUD, M. D. ..... Warren

SECOND VICE PRESIDENT
HARRY P. RITCHIE, M. D. ..... St. Paul

THIRD VICE PRESIDENT
J. S. MESKER, M. D. ..... Olivia

SECRETARY
CARL B. DRAKE, M. D. ..... St. Paul

TREASURER
F. L. BECKLEY, M. D. ..... St. Paul

COUNCILOR—FIRST DISTRICT
W. L. BURNAP, M. D. (2 years) ..... Fergus Falls

COUNCILOR—SECOND DISTRICT
J. G. MILLSPAUGH, M. D. (3 years) ..... Little Falls

COUNCILOR—THIRD DISTRICT
W. A. DENNIS, M. D. (3 years) ..... St. Paul

COUNCILOR—FOURTH DISTRICT
W. H. CONDIT, M. D. (2 years) ..... Minneapolis

COUNCILOR—FIFTH DISTRICT
H. M. WORKMAN, M. D. (3 years) ..... Tracy

COUNCILOR—SIXTH DISTRICT
F. R. WEISER, M. D. (1 year) ..... Windom

COUNCILOR—SEVENTH DISTRICT
F. A. DODGE, M. D. (2 years) ..... Le Sueur

COUNCILOR—EIGHTH DISTRICT
W. F. BRAASCH, M. D. (1 year) ..... Rochester

MEMBERS OF THE HOUSE OF DELEGATES OF THE AMERICAN MEDICAL ASSOCIATION

Delegates
J. L. ROTHROCK, M. D. (2 years) ..... St. Paul
J. W. BELL, M. D. (1 year) ..... Minneapolis

Alternates
J. FRANK CORBETT, M. D. (2 years) ..... Minneapolis
J. H. ADAIR, M. D. (1 year) ..... Owatonna

COMMITTEE ON PUBLIC POLICY AND LEGISLATION
F. J. SAVAGE, M. D. ..... St. Paul
S. M. WHITE, M. D. ..... Minneapolis
E. L. TUOHY, M. D. ..... Duluth

MEMBER OF NATIONAL EXECUTIVE COUNCIL
H. P. RITCHIE, M. D. ..... St. Paul

COMMITTEE ON SOCIAL INSURANCE
W. A. COVENTRY, M. D. ..... Duluth
H. W. MEYERDING, M. D. ..... Rochester
W. R. HUMPHREY, M. D. ..... Stillwater

COMMITTEE FOR GORGAS MEMORIAL FUND
THOS. H. McDAVITT, M. D. ..... St. Paul
A. A. LAW, M. D. ..... Minneapolis
B. P. ROSENBERRY, M. D. ..... Winona

SECTION ON MEDICINE
H. Z. GIFFIN, M. D. ..... Rochester
A. C. BAKER, M. D. ..... Fergus Falls

SECTION ON SURGERY
JOHN C. STALEY, M. D. ..... St. Paul
GILBERT J. THOMAS, M. D. ..... Minneapolis

COMMITTEE ON CANCER
VERNE C. HUNT ..... Rochester
E. T. BELL, M. D. ..... Minneapolis
E. MENDELSSOHN JONES, M. D. ..... St. Paul

EDITING AND PUBLISHING COMMITTEE
R. E. FARR, M. D. (5 years) ..... Minneapolis
L. B. WILSON, M. D. (3 years) ..... Rochester
H. LONGSTREET TAYLOR, M. D. (4 years) ..... St. Paul
F. L. ADAIR, M. D. (2 years) ..... Minneapolis
J. T. CHRISTISON, M. D. (1 year) ..... St. Paul

COMMITTEE ON NECROLOGY
JOHN H. ADAIR, M. D. ..... Owatonna
J. W. BELL, Sr., M. D. ..... Minneapolis

COMMITTEE ON RULES AND ORDER OF BUSINESS
THEODOR BRATRUD, M. D. ..... Warren
M. S. HENDERSON, M. D. ..... Rochester
J. F. CORBETT, M. D. ..... Minneapolis

COMMITTEE ON HOSPITALS AND MEDICAL EDUCATION
W. F. BRAASCH, M. D. ..... Rochester
ARCHA WILCOX, M. D. ..... Minneapolis
A. R. COLVIN, M. D. ..... St. Paul

COMMITTEE ON PUBLIC HEALTH
E. L. TUOHY, M. D. ..... Duluth
A. J. CHESLEY, M. D. ..... Minneapolis
H. F. HELMHOLZ, M. D. ..... Rochester

COMMITTEE ON PUBLIC HEALTH PROBLEMS IN EDUCATION
A. J. CHESLEY, M. D. ..... St. Paul
ELIZABETH A. WOODWORTH, M. D. ..... Minneapolis
N. O. PEARCE, M. D. ..... Minneapolis

COMMITTEE ON MISCELLANEOUS BUSINESS
H. F. McGUIGAN, M. D. ..... Red Wing
O. W. PARKER, M. D. ..... Ely
WM. J. McCARTHY, M. D. ..... Madelia

STATE-WIDE PUBLICITY COMMITTEE
N. O. PEARCE, M. D. ..... Minneapolis
J. A. THABES, M. D. ..... Brainerd
W. R. HUMPHREY, M. D. ..... Stillwater
B. S. BOHLING, M. D. ..... Sandstone
G. E. PARSONS, M. D. ..... Elk River
H. W. GOEHRS, M. D. ..... St. Cloud
E. H. FROST, M. D. ..... Willmar
T. E. FLINN, M. D. ..... Redwood Falls
T. F. HAMMERMEISTER, M. D. ..... New Ulm
H. M. WORKMAN, M. D. ..... Tracy
F. R. WEISER, M. D. ..... Windom
W. J. McCARTHY, M. D. ..... Madelia
J. E. LE CLERC, M. D. ..... Le Sueur
FRED SHEPPARD, M. D. ..... Hutchinson
L. H. RUTLEDGE, M. D. ..... Detroit
THEO. BRATRUD, M. D. ..... Warren
B. R. KARN, M. D. ..... Ortonville
O. T. SHERPING, M. D. ..... Fergus Falls
J. J. RATCLIFFE, M. D. ..... Aitkin
E. L. TUOHY, M. D. ..... Duluth
A. B. STUART, M. D. ..... Cloquet
L. HARRIMAN, M. D. ..... Howard Lake
A. W. ROBERTSON, M. D. ..... Litchfield
H. T. McGUIGAN, M. D. ..... Red Wing
C. M. ROBILLIARD, M. D. ..... Faribault
HUGO BRANYAN, M. D. ..... Wabasha
ROY ANDREWS, M. D. ..... Mankato
GEORGE A. LOVE, M. D. ..... Preston
A. W. ALLEN, M. D. ..... Austin
ELMER E. HARRISON, M. D. ..... West Concord
H. F. HELMHOLZ, M. D. ..... Rochester
F. A. SWARTWOOD, M. D. ..... Waseca
B. P. ROSENBERRY, M. D. ..... Winona
J. P. VON BERG, M. D. ..... Albert Lea
J. H. ADAIR, M. D. ..... Owatonna
J. F. CORBETT, M. D. ..... Minneapolis
J. C. LITZENBERG, M. D. ..... Minneapolis
W. A. JONES, M. D. ..... Minneapolis
GEORGE D. HEAD, M. D. ..... Minneapolis
HENRY ULRICH, M. D. ..... Minneapolis
A. E. BENJAMIN, M. D. ..... Minneapolis
CHARLES WESTON, M. D. ..... Minneapolis
CARL B. DRAKE, M. D. ..... Saint Paul
WALTER RAMSEY, M. D. ..... Saint Paul
ROBERT EARL, M. D. ..... Saint Paul
E. M. HAMMES, M. D. ..... Saint Paul
W. A. DENNIS, M. D. ..... Saint Paul
J. T. CHRISTISON, M. D. ..... Saint Paul
H. LONGSTREET TAYLOR, M. D. ..... Saint Paul
C. L. SCOFIELD, M. D. ..... Benson
CHARLES H. MAYO, M. D. ..... Rochester

Minnesota State Medical Association

DISTRICT AND COUNTY ROSTER

FIRST DISTRICT

COUNCILOR, W. L. BURNAP, M. D. (2 years).....Fergus Falls

Clay-Becker County Medical Society

Regular meetings, second Thursday of January, April, July and October
Annual meeting, October

President
Gosslee, G. L.....Moorhead
Secretary
Helmark, J. H.....Moorhead

Aborn, W. H.....Hawley
Archibald, F. M.....Mahnomen
Bergheim, M. C.....Hawley
Bottolfson, B. T.....Moorhead
Darrow, D. C.....Moorhead
Gosslee, G. L.....Moorhead
Hagen, O. J.....Moorhead
Haight, G. G.....Audubon
Helmark, Jacob H.....Moorhead
Hoit, E. E.....Detroit
Humphrey, E. W.....Moorhead
Larson, O. O.....Detroit
Lowe, L. M.....Glyndon
Meighen, J. W.....Ulen
Patterson, C. H.....Barnesville
Rutledge, L. H.....Detroit
Simison, C. W.....Hawley
Thornby, H. J.....Moorhead
Thysell, F. A.....Moorhead
Weeks, L. C.....Detroit
Winberg, O. K.....Lake Park

Red River Valley Medical Society

Kittson, Marshall, Polk, Roseau, Pennington, Red Lake and Norman Counties
Regular meetings in March, June, September and December
Annual meeting, December

President
Locken, O. E.....Crookston
Secretary
Brown, Lyle L. .....Crookston

Berge, H. M.....Twin Valley
Bowers, J. T....Thief River Falls
Bratrud, E. .....Warren
Bratrud, Theo. .....Warren
Brown, Lyle L.....Crookston
Delmore, J. L.....Roseau
Dryden, F. M.....Crookston
Dunlop, Alex .....Crookston
Froelich, H. W..Thief River Falls
Griffin, P. J.....Fertile
Henney, Wm. H.....McIntosh
Hodgson, H. H.....Crookston
Hollands, Wm. .....Fisher
Holte, Halvor .....Crookston
Johnson, Geo. L.....Newfolden
Kahala, Arthur .....Crookston
Kirk, G. P.....E. Grand Forks
Kirsch, R. L.....Crookston
Kjelland, J. S..E. Ellsworth, Wis.
Locken, O. E.....Crookston
Meland, O. N.....Warren
Melby, O. F.....Thief River Falls
Milan, M. Geo...Thief River Falls
Nelson, H. E.....Crookston
Norman, J. F.....Crookston
Ohnstad, J. .....McIntosh
Olson, O. H.....Erskine
Oppegaard, M. O.....Crookston
Roy, J A.....Stephen
Wattam, G. S.....Warren

West Central Minnesota Medical Society

Bigstone, Traverse, Stevens, Pope, and part of Grant Counties
Regular meetings, June and December
Annual meeting, December

President
Christenson, C. R.....Starbuck
Secretary
Leuty, Amos .....Morris

Arnson, J. M.....Graceville
Bates, B. V.....Wheaton
Bolsta, Chas. .....Ortonville
Caine, C. E.....Morris
Christenson, C. R.....Starbuck
Crandall, Wm.....Browns Valley
Eberlin, E. A.....Glenwood
Elsey, J. R.....Glenwood
Ewing, C. F.....Wheaton
Fitzgerald, E. T.....Morris
Gibbon, L. L.....Lowry
Karn, B. R.....Ortonville
Leland, J. T.....Herman
Leuty, Amos .....Morris
Linde, Herman .....Cyrus
Oliver, C. I.....Graceville
O'Donnell, D. M.....Ortonville
Opheim, O. V.....Starbuck
Ramson, L. M.....Hancock
Randall, B. M.....Graceville
Shelver, H. J.....Ortonville
Weir, J. D.....Beardsley

Park Region District Medical Society

Ottertail, Douglas, Grant and Wilkin Counties
Regular meetings, second Wednesday in January, April, July and October
Annual meeting in January

President
Haugen, G. T.....Fergus Falls
Secretary
Paulson, Theo. S....Fergus Falls

Baker, A. C.....Fergus Falls
Boysen, P. .....Pelican Rapids
Brabec, F. J.....Perham
Broker, W. S.....Battle Lake
Burnap, W. L.....Fergus Falls
Conyngham, Edw. F...Underwood
Cowing, P. G.....Evansville
Drought, W. W.....Fergus Falls
Esser, John .....Perham
Estrem, C. O.....Fergus Falls
Freeborn, J. A.....Fergus Falls
Goodson, C. M.....Fergus Falls
Gowdy, R. A.....Alexandria
Hand, W. R.....Elbow Lake
Haskell, A. D.....Alexandria
Haugen, G. T.....Fergus Falls
Haugen, O. M.....Fergus Falls
Hoffman, J. .....Henning
Kittelson, Theo. N..Fergus Falls
Lee, W. A.....Fergus Falls
Lewis, A. J.....Henning
Liebold, H. H....Parkers Prairie
Love, Fred A.....Carlos
Meckstroth, C. N.....Brandon
Naegeli, Frank.....Fergus Falls
Nelson, O. N.....Battle Lake
Otto, H. C.....Frazee
Patterson, W. L.....Fergus Falls
Paulson, Theo.....Fergus Falls
Powers, F. W.....Barrett
Reeve, E. T.....Elbow Lake
Satersmoen, Theo..Pelican Rapids
Schneider, Clarence L...Deer Creek
Sherping, O. Th.....Fergus Falls
Stewart, R. I.....Wendell
Swanson, R. E.....Alexandria
Vigen, J. G.....Fergus Falls
Wray, W. E.....Campbell

SECOND DISTRICT

COUNCILOR, J. G. MILLSPAUGH, M. D. (3 years).....Little Falls

Aitkin County Medical Society

Regular meetings, first Monday in each month
Annual meeting, first Monday in December

President
Graves, Carlton .....Aitkin
Secretary
Ratcliffe, J. J.....Aitkin

Catlin, T. J.....Palisade
Graves, C. .....Aitkin
Kelly, B. W.....Aitkin
Kerlan, S. Z.....McGregor
McHugh, R. F.....Aitkin
Ratcliffe, J. J.....Aitkin

Upper Mississippi County Medical Society

Crow Wing, Morrison, Cass and Beltrami Counties
Regular meetings in May and January
Annual meeting, January

President
Withrow, M. E. .....
International Falls
Secretary
Badeaux, G. I.....Brainerd

Allen, F. H.....Staples
Badeaux, G. I.....Brainerd
Beise, R. A.....Brainerd
Bone, Merle .....Kelliher
Christie, G. R.....Long Prairie
Corrigan, J. E.....Spooner
Courtney, Walter .....Brainerd
Craig, C. C...International Falls
Crowl, Verne C.....Bertha
Davis, L. T.....Wadena
Derauf, B. I.....Brainerd
Douglas, H. E.....Blackduck
Douglas, J. E...State Sanatorium

Forrest, C. G.....Clearbrook
Gerber, Milo P.....Brainerd
Gilmore, R. .....Bemidji
Halenbeck, P. L.....Crosby
Hall, P. M.....State Sanatorium
Healy, R. J.....Pierz
Holman, E. E.....Pine River
Holst, C. F.....Little Falls
Holst, J. B.....Little Falls
House, Z. E.....Cass Lake
Johnson, E. W.....Bemidji
Johnson, O. V.....Sebeka
Kenyon, Paul .....Wadena
Knickerbocker, V. H.....Staples
Laney, R. L.....Puposky
Laughlin, J. T.....Grey Eagle
McCann, D. F.....Bemidji
Marcum, E. H.....Bemidji
Miller, W. A.....New York Mills
Millspaugh, J. G.....Little Falls
Nelson, Nesmuth.....Brainerd

Nicholson, Jos. .....Brainerd
Nordin, C. G.....Brainerd
Osburn, Burt F...Internat'l Falls
Parrott, B. W.....Long Prairie
Pengelly, E. J.....Ironton
Pierce, Chas. H.....Wadena
Roberts, L. M.....Little Falls
Shannon, S. S.....Crosby
Smith, B. A.....Crosby
Smith, W. H.....Cass Lake
Thabes, J. A.....Brainerd
Van Valkenburg, B. F.....
Long Prairie
Waldie, Geo. McL.....Wadena
Watson, A. M.....Royalton
Watson, J. D.....Holdingford
Wilcox, F. L.....Walker
Will, W. W.....Bertha
Williams, R. J.....Pine River
Withrow, M. E...Internat'l Falls
Woolway, C. J.....Deerwood

THIRD DISTRICT

COUNCILOR, W. A. DENNIS, M. D. (3 years).....St. Paul

Ramsey County Medical Society

Regular meetings, last Monday of each month except June, July and August
Annual meeting last Monday in January

President
Sterner, E. G.....St. Paul
Secretary
Hammes, E. M.....St. Paul

Abbott, J. S.....St. Paul
Abramovich, J. H.....St. Paul
Ahrens, A. E.....St. Paul
Ahrens, A. H.....St. Paul
Alden, J. F.....St. Paul
Aldes, Harry .....St. Paul
Alexander, F. H.....St. Paul
Allen, Mason .....St. Paul
Ancker, A. B.....St. Paul
Andres, R. G.....St. Paul
Armstrong, J. M.....St. Paul
Arouni, Khalil .....St. Paul
Arzt, C. P.....St. Paul
Bacon, Donald K.....St. Paul
Bacon, Knox .....St. Paul
Bacon, L. C.....St. Paul
Balcome, F. E.....St. Paul
Ball, C. R.....St. Paul
Barry, L. W.....St. Paul
Barsness, Nellie .....St. Paul
Beadle, W. D.....St. Paul
Beals, Hugh .....St. Paul
Beckley, F. L.....St. Paul
Bell, C. C.....St. Paul
Benepe, L. M.....St. Paul
Bennion, P. H.....St. Paul
Bentley, Norman P.....St. Paul
Berrisford, Paul D.....St. Paul
Binger, H. E.....St. Paul
Birnberg, T. L.....St. Paul
Bock, R. A.....St. Paul
Boeckmann, Eduard .....St. Paul
Boeckmann, Egil .....St. Paul
Bohland, E. H.....St. Paul

Bole, R. S.....St. Paul
Boleyn, E. S.....Stillwater
Bolstad, H. C.....St. Paul
Bosworth, Robinson .....St. Paul
Brand, G. D.....St. Paul
Bray, E. R.....St. Paul
Brimhall, J. B.....St. Paul
Brodie, Walter D.....St. Paul
Brooks, D. F.....St. Paul
Brooks, G. F.....St. Paul
Brown, Edw. I.....St. Paul
Brown, John C.....St. Paul
Brown, LeRoy .....St. Paul
Brown, Silas E.....St. Paul
Buckley, E. W.....St. Paul
Burch, F. E.....St. Paul
Burfiend, G. H.....St. Paul
Burns, F. W.....St. Paul
Burns, R. M.....St. Paul
Buscher, H. .....St. Paul
Cameron, J. A.....St. Paul
Campbell, E. Paul.....St. Paul
Campbell, J. E....South St. Paul
Cannon, C. M.....St. Paul
Cannon, Harry .....St. Paul
Carman, C. L.....St. Paul
Carman, Paul I.....St. Paul
Carroll, Wm. C.....St. Paul
Cavanaugh, J. O.....St. Paul
Chandler, O. B.....St. Paul
Chatterton, C. C.....St. Paul
Christiansen, A. .....St. Paul
Christison, J. T.....St. Paul
Churchill, A. G.....St. Paul
Clark, T. C..Soldiers' Home, Mpls.
Cobb, S. G.....St. Paul
Colby, Woodward .....St. Paul
Cole, Wallace .....St. Paul
Collie, H. G.....St. Paul
Colvin, A. R.....St. Paul

Comstock, A. E.....St. Paul
Conner, Wm. H.....St. Paul
Connor, C. E.....St. Paul
Cook, Paul B.....St. Paul
Corniea, A. D.....St. Paul
Countryman, Roger S.....St. Paul
Cowern, E. W.....North St. Paul
Dack, L. G.....St. Paul
Darling, J. B.....St. Paul
Daugherty, E. B.....St. Paul
Daugherty, L. E.....St. Paul
Davis, Herbert .....St. Paul
Davis, William .....St. Paul
Dedolph, K. .....St. Paul
Dennis, W. A.....St. Paul
Dickson, Thos. H., Jr.....St. Paul
Dittman, Geo. C.....St. Paul
Dohm, A. J.....St. Paul
Drake, Carl B.....St. Paul
Dunn, J. N.....St. Paul
Earl, Geo. A.....St. Paul
Earl, Robert C.....St. Paul
Ely, O. S.....South St. Paul
Engberg, E. J.....St. Paul
Ernest, G. C.....St. Paul
Eshelby, E. C.....St. Paul
Evert, John A.....St. Paul
Ferguson, J. C.....St. Paul
Fesler, Harold H.....St. Paul
Flagstad, A. E.....St. Paul
Fogarty, C. W.....St. Paul
Foley, F. E. B.....St. Paul
Freeman, C. D.....St. Paul
Fulton, J. F.....St. Paul
Furber, W. W.....Cottage Grove
Gager, E. C.....St. Paul
Geer, Everett K.....St. Paul
Geissinger, John D.....St. Paul
Geist, Geo. A.....St. Paul
Ghent, Harry .....St. Paul

Ghent, M. M.....St. Paul
Giere, E. O.....St. Paul
Gilfillan, J. S.....St. Paul
Ginsberg, Wm. .....St. Paul
Goltz, E. V.....St. Paul
Gotham, C. L.....St. Paul
Gratzek, Thos. .....St. Paul
Greene, C. L.....St. Paul
Gruenhagen, Arnold P....St. Paul
Hagaman, Geo. K.....St. Paul
Hall, A. R.....St. Paul
Hammes, E. M.....St. Paul
Hammond, J. F.....St. Paul
Hathaway, S. J...Champaign, Ill.
Hawkins, V. J.....St. Paul
Heath, A. C.....St. Paul
Hengstler, W. H.....St. Paul
Hensel, C. N.....St. Paul
Herrmann, E. T.....St. Paul
Heseltine, V. G.....Taylors Falls
Hesselgrave, S. S.....St. Paul
Hilger, A. W.....St. Paul
Hilger, D. D.....St. Paul
Hilger, L. A.....St. Paul
Hoff, Alfred .....St. Paul
Hoff, Peder A.....St. Paul
Hoffman, Max H.....St. Paul
Holcomb, J. T.....St. Paul
Holcomb, O. W.....St. Paul
Holl, P. M.....Minneapolis
Howard, W. S.....St. Paul
Hullsiek, H. E.....St. Paul
Hultkrans, Joel C.....St. Paul
Hunt, H. E.....St. Paul
Ide, Arthur W.....St. Paul
Jesion, J. W.....St. Paul
Johnson, Asa M.....St. Paul
Johnson, Hartland C.....St. Paul
Johnson, T. H.....St. Paul
Jones, E. M.....St. Paul
Kannary, E. L.....St. Paul
Kelly, John V.....St. Paul
Kelly, Paul H.....St. Paul
Kesting, Herman .....St. Paul
King, Walter E.....St. Paul
Kistler, A. S.....St. Paul
Klein, H. N.....St. Paul
Knauff, M. K.....St. Paul
Kramer, G. B.....St. Paul
Kvitrud, G. .....St. Paul
Langenderfer, F. V.....St. Paul
Larsen, C. L.....St. Paul
Larson, M. L.....St. Paul
Leavenworth, R. O.....St. Paul
Leahy, B. .....St. Paul
Leitch, Archibald .....St. Paul
Lepak, John A.....St. Paul
Lerche, William .....St. Paul
Lewis, J. B.....South St. Paul
Lewis, W. W.....St. Paul
Lick, C. Louis.....St. Paul

Little, W. J.....St. Paul
Lufkin, H. M.....St. Paul
Lundholm, A. M.....St. Paul

McCarthy, W. R.....St. Paul
McClanahan, J. H.....White Bear
McClanahan, T. S.....White Bear
McCloud, C. N.....St. Paul
McDavitt, Thomas .....St. Paul
McKeon, Owen .....St. Paul
McLaren, Jennette M.....St. Paul
McNevin, C. F.....St. Paul
MacLaren, Archibald.....St. Paul
Maloney, T. J.....St. Paul
Mark, Arthur E.....St. Paul
Martineau, J. L.....St. Paul
Meyerding, E. A.....St. Paul
Mitchell, Frederick .....St. Paul
Mogilner, S. N.....St. Paul
Molander, H. A.....St. Paul
Morris, R. Edwin.....St. Paul
Morrissey, F. B.....St. Paul
Morse, Russell W.....St. Paul
Mortenson, N. G.....St. Paul
Moss, Myer N.....St. Paul
Moynihan, T. J.....St. Paul
Murphy, E. F.....St. Paul
Myers, Thos. .....St. Paul

Neher, F. H.....St. Paul
Nelson, L. A.....St. Paul
Nichols, A. E.....St. Paul
Nippert, H. T.....St. Paul
Norris, E. H.....St. Paul
Nye, Katherine A.....St. Paul
Nye, Lillian .....St. Paul

O'Brien, H. J.....St. Paul
O'Connor, J. V.....St. Paul
Oerting, Harry .....St. Paul
Ogden, B. H.....St. Paul
Ogden, Warner .....St. Paul
Ohage, Justus .....St. Paul
Ohage, Justus, Jr.....St. Paul
Olson, Chas. A.....St. Paul
Ostergren, E. W.....St. Paul
Pearson, F. R.....St. Paul
Pedersen, A. H.....St. Paul
Perry, C. G.....St. Paul
Peterson, V. N.....St. Paul
Pine, Auten A.....St. Paul
Plondke, F. J.....St. Paul
Platt, J. J.....St. Paul
Ramsey, W. R.....St. Paul
Richards, E. T. F.....St. Paul
Richardson, H. E.....St. Paul
Riggs, C. Eugene.....St. Paul
Ritchie, H. P.....St. Paul
Rogers, F. D.....St. Paul
Rogers, John T.....St. Paul
Rothrock, J. L.....St. Paul
Rothschild, H. J.....St. Paul
Roy, Philemon .....St. Paul

Ruhberg, Geo. N.....St. Paul
Rutherford, W. C.....St. Paul
Ryan, John J.....St. Paul
Savage, F. J.....St. Paul
Schatz, F. J.....St. Paul
Schoch, R. B. J.....St. Paul
Schons, E. .....St. Paul
Schuldt, F. C.....St. Paul
Schulze, Albert G.....St. Paul
Schwyzer, Arnold .....St. Paul
Senkler, G. E.....St. Paul
Shannon, W. Ray.....St. Paul
Shapere, A. D.....St. Paul
Shellman, John L.....St. Paul
Shimonek, Anton .....St. Paul
Simon, B. F.....St. Paul
Simon, Geo. H.....St. Paul
Skinner, H. O.....St. Paul
Sneve, Haldor .....St. Paul
Snyder, Geo. W.....St. Paul
Sohlberg, Olof .....St. Paul
Sprafka, J. M.....St. Paul
Staley, J. C.....St. Paul
Steen, A. H.....Cottage Grove
Sterner, E. G.....St. Paul
Sterner, O. W.....St. Paul
Stevens, F. A.....Lake Elmo
Stewart, Alexander .....St. Paul
Stierle, Adolph .....St. Paul
Stinnette, S. E.....St. Paul
Stolpestad, H. L.....St. Paul
Swanson, Edwin O.....St. Paul
Sweeney, Arthur .....St. Paul

Taylor, H. L.....St. Paul
Teisberg, C. B.....St. Paul
Tiber, L. J.....St. Paul

Van Norman, R. H.....St. Paul
Van Slyke, Chas. A.....St. Paul
Vercellini, G. .....St. Paul
Von der Weyer, William.St. Paul

Wald, R. H.....St. Paul
Wallinga, John H.....St. Paul
Walters, B. Frank.....St. Paul
Warren, E. L.....St. Paul
Warner, E. F.....St. Paul
Warwick, Margaret .....St. Paul
Welch, M. C.....St. Paul
Wheeler, M. W.....St. Paul
Whitacre, J. C.....St. Paul
Whitcomb, Ed. H.....St. Paul
White, J. S.....St. Paul
Whitmore, F. W.....St. Paul
Whitney, A. W.....St. Paul
Williams, Clayton .....St. Paul
Winnick, J. B.....St. Paul
Wold, K. C.....St. Paul
Wood, H. G.....St. Paul
Ylvisaker, L. S.....St. Paul
Zander, C. H.....St. Paul
Zimmerman, H. B.....St. Paul

Washington County Medical Society

Regular meetings held on second Tuesday of the odd numbered months
Annual meeting, November

President
Haines, J. H.....Stillwater
Secretary
Landeen, F. G.....Stillwater
Brown, A. E.....Stillwater

Freligh, E. O.....Stillwater
Haines, J. H.....Stillwater
Humphrey, W. R.....Stillwater
Johnson, Walfred .....Stillwater
Kalinoff, D. .....Stillwater
Landeen, F. G.....Stillwater
Mingo, F. E.....Hugo

Newman, G. A.....Stillwater
Poirier, J. A.....Forest Lake
Sherman, C. H.....
Marine-on-St. Croix
Stuhr, J. W.....Stillwater
Thompson, V. C.....Stillwater

Chisago-Pine County Medical Society

Regular meetings, midsummer, July or August
Annual meetings, second Tuesday in January

President
Wiseman, Robert L.....Pine City
Secretary
Gray, Clyde E.....Rush City
Bohling, B. S.....Sandstone

Doyle, L. O.....Lindstrom
Dredge, H. P.....Sandstone
Ehmke, W. C.....Willow River
Flom, A. O.....Chisago City
Gray, Clyde E.....Rush City
Gunz, A. W.....Center City

Kelsey, C. G.....Hinckley
Paulson, C. W.....North Branch
Stowe, A. J.....Rush City
Tilton, A. J.....Alden
Wiseman, Robert L.....Pine City
Zelen, Thos. .....North Branch

Central Minnesota District Medical Society

Mille Lacs, Sherburne, Isanti and Kanabec Counties
Regular meetings, July and October
Annual meeting, July

President
Cooney, H. C.....Princeton
Secretary
Parsons, Geo. E.....Elk River

Cooney, H. C.....Princeton
Parsons, Geo. E.....Elk River
Roadman, I. M.....Ponsford
Shulean, N. S.....Cambridge

Swensen, Chas.....Braham
Vik, A. Elliott.....Big Lake
Vrooman, F. E.....St. Francis

St. Louis County Medical Society

St. Louis, Cook, Lake and Carlton Counties

Regular meetings, second Thursday of each month
Annual meeting, second Thursday in October

President
Parker, Owen W.....Ely
Secretary
Magney, F. H.....Duluth

Abbott, Wm. P.....Duluth
Adams, B. S.....Hibbing
Anderson, Hilding C.....Duluth
Arminen, K. V.....Duluth
Armstrong, E. L.....Duluth
Athens, A. S.....Buhl
Ayers, G. T.....Ely
Bagley, W. R.....Duluth
Barney, L. A.....Duluth
Barrett, Fred .....Gilbert
Bergquist, K. E.....Duluth
Binet, H. E.....Grand Rapids
Blacklock, S. S.....Hibbing
Blakely, C. C.....Barnum
Bouman, P. G.....Duluth
Boyer, S. H.....Duluth
Braden, A. J.....Duluth
Bray, C. W.....Biwabik
Briggs, F. W.....Duluth
Brunet, L. M.....Cloquet
Bullen, F. W.....Hibbing
Burns, H. J.....Duluth
Burns, R. L.....Two Harbors
Carstens, C. F.....Hibbing
Chapman, T. L.....Duluth
Cheney, E. L.....Duluth
Christenson, E. P.....Two Harbors
Clark, F. F.....Duluth
Collins, A. N.....Duluth
Collins, H. C.....Duluth
Croson, F. R.....Proctor
Cosgrove, J. H.....Duluth
Coventry, W. A.....Duluth
Crowe, J. H.....Virginia
Davis, B. F.....Duluth
Davis, H. S.....Duluth
Doolittle, L. E.....Duluth
Doyle, Geo. C.....Duluth
Drenning, F. C.....Duluth
Durgin, F. L.....Nopeming
Eisenman, W. F.....Chisholm
Ekblad, J. W.....Duluth
Eklund, W. J.....Duluth
Elias, F. J.....Duluth
Eppard, R. M.....Cloquet
Estrem, T. A.....Hibbing
Fahey, E. W.....Duluth
Fleming, J.....Cloquet
Forbes, R. S.....Duluth
Frasier, Geo. W.....Duluth
Gauthier, W. .....Virginia
Gendron, J. F.....Grand Rapids
Gilbert, J. D.....Carlton
Gillispie, N. H.....Duluth
Giroux, A. A.....Duluth
Goodman, C. E.....Virginia
Graham, David.....Duluth
Graham, Reginald.....Duluth
Graham, Robert.....Duluth
Grawn, F. A.....Duluth
Greaves, F. C.....Duluth
Greeley, L. O.....Duluth
Ground, H. T.....Virginia
Hall, A. E.....Cusson
Haney, C. L.....Duluth
Hayes, M. F.....Nashwauk
Heimark, O. E.....Duluth
Hirschboeck, F. J.....Duluth
Hirschfield, M. S.....Duluth
Hovde, H.....Duluth
Hursch, M. M.....Grand Rapids
Jensen, T. J.....Duluth
Judson, W. E.....Duluth
Kean, N. D.....Coleraine
Keyes, C. R.....Duluth
Kiesling, I. H.....Hibbing
King, Wm. S.....Eveleth
Klein, H.....Duluth
Kohlbry, C. O.....Duluth
Kraft, P.....Duluth
Kuth, J. R.....Duluth
Laird, A. T.....Nopeming
Loofbourrow, E. H.....Keewatin
Lenont, C. B.....Virginia
Lepak, F. J.....Duluth
Litman, Samuel, N...Meadowlands
Lindgren, E. I.....Duluth
Lum, C. E.....Duluth
Lynam, F.....Duluth
McCarthy, Paul D.....Babitt
McComb, C. F.....Duluth
McCoy, Mary.....Duluth
McCuen, J. A.....Duluth
McDonald, A. L.....Duluth
McGiffert, E. N.....Duluth
McHaffie, O. L.....Duluth
McIntyre, E. H.....Virginia
Magie, W. H.....Duluth
Magney, F. H.....Duluth
Manley, J. R.....Duluth
Martin, E. T.....Marble
Martin, T. R.....Duluth
Mattill, P. M.....Chisholm
Merriman, L. L.....Duluth
More, C. W.....Eveleth
Morss, C. R.....Zumbrota
Morsman, L. W.....Hibbing
Murray, D. D.....Duluth
Nelson, E. H.....Chisholm
Nicholson, M. A.....Duluth
Olson, Albert E.....Duluth
Oredson, O. A.....Duluth
Pake, S. G.....Duluth
Paradine, J.....Duluth
Pare, L. T.....Duluth
Parker, O. W.....Ely
Payette, C. H.....Duluth
Pennie, D. F.....Duluth
Powers, J. E.....Duluth
Raadquist, C. S.....Hibbing
Raihala, J.....Virginia
Raiter, Franklin W. S....Cloquet
Reynolds, H.....Hibbing
Rippert, J. A.....Duluth
Rood, D. C.....Hibbing
Robinson, J. M.....Duluth
Rowe, O. W.....Duluth
Rudie, P. S.....Duluth
Ryan, J. W.....Duluth
St. Clair, G. G.....Duluth
Scherer, C. A.....Duluth
Schroder, C. H.....Duluth
Schwartz, A. N.....Duluth
Seashore, D. E.....Duluth
Shapiro, E. Z.....Duluth
Shaw, A. W.....Buhl
Slyfield, F. F.....Duluth
Spicer, F. W.....Duluth
Spurbeck, R. G.....Cloquet
Strathern, M. L.....Gilbert
Strobel, W. G.....Duluth
Stuart, A. B.....Cloquet
Sukeforth, L. A.....Duluth
Sutherland, H. N.....Ely
Taylor, A. C.....Duluth
Taylor, C. W.....Duluth
Tibbetts, M. H.....Duluth
Tilderquist, D. L.....Duluth
Tuohy, E. L.....Duluth
Turnbull, F. M.....Duluth
Urberg, S. E.....Duluth
Vercellini, C. E.....Duluth
Walker, A. E.....Duluth
Walters, F. R.....Moose Lake
Webber, E. E.....Proctor
Webster, H. E.....Duluth
Weirick, H. E.....Hibbing
Wilkinson, Stella.....Duluth
Winter, J. A.....Duluth
Young, V. A.....Duluth

FOURTH DISTRICT

COUNCILOR, W. H. CONDIT (2 years).....Minneapolis

Hennepin County Medical Society

Regular meetings, first Monday in each month excepting July and August
Annual meeting, first Monday in January

President
Adair, F. L.....Minneapolis
Secretary
La Vake, R. T.....Minneapolis

Abbott, A. W.....Minneapolis
Adair, F. L.....Minneapolis
Alger, E. W.....Minneapolis
Aling, C. P.....Minneapolis
Allen, H. W.....Minneapolis
Allison, R. G.....Minneapolis
Almquist, H. E.....Minneapolis
Anderson, A. E.....Minneapolis
Anderson, Arnt.....Minneapolis
Anderson, D. D.....Minneapolis
Anderson, E. D.....Minneapolis
Anderson, James K...Oak Terrace
Annis, H. B.....Minneapolis
Arey, H. C.....Excelsior
Aune, Martin .....Minneapolis
Aurand, W. H.....Minneapolis
Aurness, P. A.....Minneapolis
Avery, J. F.....Minneapolis
Aylmer, A. L.....Minneapolis
Baier, Florence.....Minneapolis
Baker, A. T.....Minneapolis
Baker, E. L.....Minneapolis
Baker, Looe.....Minneapolis
Baker, Harry A.....Minneapolis
Bakke, O. H.....Minneapolis
Baldwin, L. B.....Minneapolis
Barber, J. P.....Minneapolis
Barron, Moses.....Minneapolis
Bass, G. W.....Minneapolis
Baxter, S. H.....Minneapolis
Beard, Archie.....Minneapolis
Bedford, E. W.....Minneapolis
Bell, J. W. Jr.....Minneapolis
Bell, J. W. Sr.....Minneapolis
Benedict, E. E.....Minneapolis
Benjamin, A. E.....Minneapolis
Benn, F. G.....Minneapolis
Benson, Geo. E.....Minneapolis
Benson, R. D.....Minneapolis
Bessesen, A. N.....Minneapolis
Bishop, Chas. W.....Minneapolis
Bissell, F. S.....Minneapolis
Blake, James.....Hopkins
Bockman, M. W. H....Minneapolis
Booth, A. E.....Minneapolis
Boreen, C. A.....Minneapolis
Bouman, H. A. H.....Minneapolis
Bratrud, Arthur F...Minneapolis
Brooks, Chas. N.....Minneapolis
Brown, E. J.....Minneapolis
Brown, E. D.....Minneapolis
Brown, R. S.....Minneapolis
Bulkley, Kenneth....Minneapolis
Butler, John.....Minneapolis
Byrnes, W. J.....Minneapolis
Cabot, V. S.....Minneapolis
Calkins, L. A.....Minneapolis
Camp, Walter E.....Minneapolis
Campbell, Lowell M...Minneapolis
Campbell, Robert....Minneapolis
Carey, Jas. B.....Minneapolis
Cheleen, S. J.....Minneapolis
Cirkler, A. A.....Minneapolis
Clark, Howard S.....Minneapolis
Condit, W. H.....Minneapolis
Cook, H. W.....Minneapolis
Corbett, J. Frank....Minneapolis
Cosman, E. O.....Minneapolis
Crafts, L. M.....Minneapolis
Cranmer, Richard R..Minneapolis
Cross, John G.....Minneapolis
Crume Geo. F.....Minneapolis
Curtin, John F.....Minneapolis
Cutts, Geo.....Minneapolis
Dahl, Elmer O.....Minneapolis
Dahl, John A.....Minneapolis
Dahlstrom A. W.....Minneapolis
Daniel, Donald H.....Minneapolis
Dart, L. D.....Minneapolis
Dezell, Earl K.....Minneapolis
Deziel, G.....Minneapolis
Disen, C. F.....Minneapolis

Donaldson, C. A.....Minneapolis
Dorge, Richard.....Minneapolis
Dornblaser, H. Bright Minneapolis
Doxey, G. L.....Minneapolis
Drake, Chas. R.....Minneapolis
Dreisbach, N. .....Minneapolis
Dunn, Geo. Robt.....Minneapolis
Dunn, Louis .....Minneapolis
Dunsmoor, F. A.....Minneapolis
Dutton, C. E.....Minneapolis
Egan, John M.....Minneapolis
Eggen, O. K.....Minneapolis
Eitel, G. G.....Minneapolis
Ellison, D. E.....Minneapolis
Erb, Fred A.....Minneapolis
Ericson, John G.....Minneapolis
Everlof, J. L.....Minneapolis
Fansler, W. A.....Minneapolis
Farr, R. E.....Minneapolis
Feidt, W. W.....Minneapolis
Fjeldstad, C. Alford..Minneapolis
Fjellman, R. C.....Minneapolis
Fleming, A. S.....Minneapolis
Fleming, C. Filmore..Minneapolis
Flocken, Chas. F.....Minneapolis
Fox, John M.....Minneapolis
Franzen, H. C.....Minneapolis
Gammell, J. H.....Minneapolis
Gardner, E. L.....Minneapolis
Geist, Emil.....Minneapolis
Giessler, Paul W.....Minneapolis
Gordon, G. J.....Minneapolis
Gosin, D. F.....Minneapolis
Goss, Harold L.....Minneapolis
Grave, Floyd .....Minneapolis
Green, E. K.....Minneapolis
Groll, S. .....Minneapolis
Gulliford, H. M.....Minneapolis
Gunderson, Harley J. Minneapolis
Gunderson, Nels. A...Minneapolis
Habein, Harold C.....Minneapolis
Hacking, Frank.....Minneapolis
Hagen, G. L.....Minneapolis
Haggard, G. D.....Minneapolis
Hall, J. M.....Minneapolis
Hallowell, W. H.....Minneapolis
Hamel, Arnold L.....Minneapolis
Hamel, C. E.....Minneapolis
Hamilton, A. S.....Minneapolis
Hansen, Erling.....Minneapolis
Hanson, Olga.....Minneapolis
Hare, E. R.....Minneapolis
Hartig, Hugo J.....Minneapolis
Harrington, C. D....Minneapolis
Hartzell, Thos. B....Minneapolis
Haverfield, Addie R..Minneapolis
Hayes, J. M.....Minneapolis
Head, G. D.....Minneapolis
Hearn, Wm. O.....Minneapolis
Hedback, A. E.....Minneapolis
Heim, R. R.....Minneapolis
Helk, H. H.....Minneapolis
Hendrickson, J. F....Minneapolis
Henry, C. E.....Minneapolis
Hiebert, J. P.....Minneapolis
Higgins, J. H.....Minneapolis
Hill, Eleanor J.....Minneapolis
Hoaglund, Arthur W..Minneapolis
Hobbs, C. A.....Minneapolis
Hodge, S. V.....Minneapolis
Holland, A. S.....Minneapolis
Holen, T.....Minneapolis
Holm, Geo. A.....Minneapolis
Howe, A. W.....Minneapolis
Huenekens, E. J.....Minneapolis
Hughes, L. D.....Minneapolis
Hvoslef, Jakob .....Minneapolis
Hynes, James.....Minneapolis
Hynes, John E.....Minneapolis
Ikeda, Kano.....Minneapolis
Irvine, H. G.....Minneapolis
Jarvis, B. W.....Minneapolis
Jensen, Louis C.....Minneapolis
Jensen, M. J.....Minneapolis
Joannides, Minas.....Minneapolis
Johnson, A. E.....Minneapolis
Johnson, A. Elof....Minneapolis
Johnson, James A....Minneapolis
Johnson, Julius.....Minneapolis
Johnson, Nimrod A...Minneapolis
Johnson, Odin J.....Minneapolis
Jones, H. W.....Minneapolis
Jones, W. A.....Minneapolis
Kennedy, C. C.....Minneapolis
Kennedy, Jane F.....Minneapolis
Kennedy, R. R.....Minneapolis
Kennedy, W. A.....Minneapolis
Kerrick, Stanley E...Minneapolis
Kimball, H. H.....Minneapolis
King, E. A.....Minneapolis
King, W. R.....Minneapolis
Kinsella, Thos. J.....Minneapolis
Kirmse, Geo. W.....Minneapolis
Kistler, A. J.....Minneapolis
Kistler, C. M.....Minneapolis
Kittelson, Olof .....Minneapolis
Knight, R. R.....Minneapolis
Knight, Ralph T.....Minneapolis
Knight, H. L.....Minneapolis
Koch, John C.....Minneapolis
Kohler, Geo. A.....Minneapolis
Koller, H. M.....Minneapolis
Koller, L. R.....Minneapolis
Kremer, Walter J....Minneapolis
Kriedt, Daniel.....Minneapolis
Kucera, Wm. J.....Minneapolis
Lebowske, Jos. A....Minneapolis
Lajoie, J. M.....Minneapolis
LaPierre, C. A.....Minneapolis
Lane, Laura A.....Minneapolis
Laurent, A. A.....Minneapolis
LaVake, R. T.....Minneapolis
Leavitt, H. H.....Minneapolis
Lee, H. M. .....Minneapolis
Lee, John W.....Minneapolis
Leland, M. N.....Minneapolis
Lemstrom, Jarl .....Minneapolis
Lewis, J. D.....Minneapolis
Lind, C. J.....Minneapolis
Lippman, H. S.....Minneapolis
Litchfield, John .....Minneapolis
Litzenberg, J. C.....Minneapolis
Logefeil, Rudolph ...Minneapolis
Long, Jesse .....Minneapolis
Loomis, E. A.....Minneapolis
Lundgren, A. C.....Minneapolis
Lynch, M. J. .....Minneapolis
Lyng, John .....Minneapolis
Lysne, Henry .....Minneapolis
McCarthy, Donald....Minneapolis
McCartney, Jas. S....Minneapolis
McDaniel, Oriana ....Minneapolis
McDermott, T. E....Minneapolis
McDonald, A. E.....Minneapolis
McDonald, D. A.....Minneapolis
McDonald, I. C.....Minneapolis
McEachran, A.....Minneapolis
McFarland, Arthur H.....
Minneapolis
McIntyre, George.....Minneapolis
McLaughlin, Jas. A...Minneapolis
McKinley, C. A. .....Minneapolis
McKinney, F. S.....Minneapolis
McPheeters, H. O....Minneapolis
Macnie, John .....Minneapolis
Maguire, Leo .....Minneapolis
Maland, C. O.....Minneapolis
Mann, A. T.....Minneapolis
Marclay, W. J.....Minneapolis
Mark, D. B. .....Minneapolis
Mariette, E.....Hopkins
Matchan, Glen R.....Minneapolis
Mathews, Justus.....Minneapolis
Maxeiner, Stanley R..Minneapolis
May, W. H.....Minneapolis
Mead, Marion A.....Minneapolis
Merkert, G. L.....Minneapolis
Meyer, E. L.....Minneapolis
Michael, J. C.....Minneapolis
Michaelson, H. E....Minneapolis
Moir, Wm. W.....Minneapolis
Monahan, J. A.....Minneapolis
Moorehead, M. B....Minneapolis
Moren Ed.....Minneapolis
Moriarty, Cecile R...Minneapolis
Morrison, A. W.....Minneapolis
Morse, John H.....Minneapolis
Morton, H. McI.....Minneapolis
Murphy, I. J.....Minneapolis
Murray, Wm. R.....Minneapolis
Myers, J. A.....Minneapolis
Nathanson, M. H....Minneapolis
Nelson, C. P.....Owatonna
Nelson, H. S.....Minneapolis
Nelson, O. E.....Minneapolis
Newhart, Horace.....Minneapolis
Nippert, L. A.....Minneapolis
Noonan, Dan F.....Minneapolis
Nootnagel, C. F.....Minneapolis
Noran, A. N.....Minneapolis
Nordin, G. T.....Minneapolis
Nordland, Martin.....Minneapolis
Noth, H. W.....Minneapolis
Oberg, C. M.....Minneapolis
O'Donnell, J. E.....Minneapolis
Olson, Frederick A...Minneapolis
Olson, G. M.....Minneapolis
Olson, Olaf A.....Minneapolis
Olson, R. G.....Minneapolis
Orton, H. N.....Minneapolis
Owre, Oscar.....Minneapolis
Parks, A. H.....Minneapolis
Patterson, W. E.....Minneapolis
Paulson, E. L.....Minneapolis
Pederson, Harold ....Minneapolis
Pederson, R. M.....Minneapolis
Peppard, T. A.....Minneapolis
Perry, Ralph St. John.....
..... Minneapolis
Peters, R. M.....Minneapolis
Petersen, Thorvald...Minneapolis
Peterson, J. R.....Minneapolis
Peterson, O. H.....Minneapolis
Pettit, C. W.....Minneapolis
Peyton, Wm. T.....Minneapolis
Phelps, Kenneth, A..Minneapolis
Pineo, W. B.....Minneapolis
Poehler, F. T.....Minneapolis
Pollock, D. K.....Minneapolis
Poppe, F. H.....Minneapolis
Pratt, Fred J.....Minneapolis
Pratt, J. A.....Minneapolis
Preine, Irvin A.....Minneapolis
Prim, J. A.....Minneapolis
Quinby, Thos. F.....Minneapolis
Quist, Henry W.....Minneapolis
Ravu, Bjarne .....Minneapolis
Reinertson, B. R.....Minneapolis
Rees, S. P.....Minneapolis
Rizor, R. I.....Minneapolis
Reynolds, J. S.....Minneapolis
Rishmiller, J. H.....Minneapolis
Roan, Carl M.....Minneapolis
Robb, E. F.....Minneapolis
Roberts, Thos. S.....Minneapolis
Roberts, W. B.....Minneapolis
Robitshek, E. C.....Minneapolis
Rochford, W. E.....Minneapolis
Rodda, F. C. .....Minneapolis
Rodgers, C. L. .....Minneapolis
Rosenwald, R. M.....Minneapolis
Rosen, S. .....Minneapolis
Rowe, Paul H.....Minneapolis
Rypins, Harold .....Minneapolis
Sawatzky, Wm. A.....Minneapolis
Schaaf, Fred. K.....Minneapolis
Schefcik, J. F.....Minneapolis
Scheldrup, N. H.....Minneapolis
Schlutz, F. W.....Minneapolis
Schmitt, Aaron F.....Minneapolis
Schussler, Otto F....Minneapolis
Schwyzer, G. .....Minneapolis
Seaberg, J. A.....Minneapolis
Seashore, Gilbert ....Minneapolis
Seham, Max .....Minneapolis
Sessions, J. C.....Minneapolis
Simons, J. H.....Minneapolis
Simpson, Ellery D....Minneapolis
Simpson, J. D.....Minneapolis
Sivertsen, Andrew ...Minneapolis
Sivertsen, Ivar .....Minneapolis
Slocumb, Maude .....Minneapolis
Smith, Adam. M.....Minneapolis
Smith, Art. E.....Minneapolis
Smith, Homer R.....Minneapolis
Smith, John F. .....Minneapolis
Smith, Norman M. ...Minneapolis
Soderlind, A. .....Minneapolis
Souba, Fred. J.....Minneapolis
Spratt, C. N. .....Minneapolis
Staples, H. L.....Minneapolis
Stewart, C. A.....Minneapolis
Stomel, Joseph .....Minneapolis
Strachauer, A. C.....Minneapolis
Strout, E. S.....Minneapolis
Strout, G. Elmer.....Minneapolis
Stuhr, Henry C.....Minneapolis
Sundt, M.....Minneapolis
Sweetser, H. B.....Minneapolis
Sweetser, Theo. .....Minneapolis
Sweitzer, S. E.....Minneapolis
Swendseen, Carl G....Minneapolis
Taft, J. O. .....Minneapolis
Taft, Walter L.....Minneapolis
Tanner, Alvin C.....Minneapolis
Taylor, Rood .....Minneapolis
Tennyson, Theo. .....Minneapolis
Thomas, D. O.....Minneapolis
Thomas, Geo. E.....Minneapolis
Thomas, Geo. H.....Minneapolis
Thomas, Gilbert J....Minneapolis
Thompson, Herb. H..Minneapolis
Tingdale, A. C.....Minneapolis
Towers, F. E.....Minneapolis
Turnacliff, D. D.....Minneapolis
Tyrrell, C. C.....Minneapolis
Ulrich, Henry L. .....Minneapolis
Ulrich, Mabel S.....Minneapolis
Undine, Clyde A.....Minneapolis
Voyer, Emile O.....Minneapolis
Waldron, C. W.....Minneapolis
Wanous, E. Z.....Minneapolis
Ward, A. W.....Minneapolis
Ward, Percy .....Minneapolis
Warham, T. T.....Minneapolis
Watson, C. W.....Minneapolis

Watson, J. A.....Minneapolis
Webb, R. C.....Minneapolis
Weisman, Sam .....Minneapolis
Welles, H. J.....Minneapolis
Weston, C. G. .....Minneapolis
Wethall, A. G.....Minneapolis
Weum, T. W.....Minneapolis
Whetstone, Mary ....Minneapolis
White, S. Marx.....Minneapolis
White, Willard D....Minneapolis
Wilcox, Archa, E.....Minneapolis
Wilcox, M. Russell...Minneapolis
Willcutt, Clarence ...Minneapolis
Williams, Robert ....Minneapolis
Willson, Hugh S.....Minneapolis
Witham, C. A. .....Minneapolis
Wittich, F. W. .....Minneapolis
Wohlrabe, A. A. .....Minneapolis
Wood, Douglas F.....Minneapolis
Woodard, F. R.....Minneapolis
Woodworth, Elizab...Minneapolis
Wright, C. B.....Minneapolis
Wright, C. D. .....Minneapolis
Wright, F. R.....Minneapolis
Wyatt, O. S.....Minneapolis
Wynne, H. M. N.....Minneapolis
Yoerg, O. W.....Minneapolis
Zaworski, E. A. .....Minneapolis
Zierold, A. A.....Minneapolis
Ziskin, Thos. .....Minneapolis

Wright County Medical Society

Regular meetings, first Tuesday after first Monday quarterly
Annual meeting, October

President
Shrader, E. E. .....Watertown
Secretary
Catlin, John J.....Buffalo

Catlin, John J.....Buffalo
Ellison, Frank .....Monticello
Freed, O. J. R.....Cokato
Harriman, L. .....Howard Lake
Hawkins, E. P. .....Montrose
Moffatt, A. G. .....Howard Lake
Phillips, A. E. .....Delano
Ridgway, A. M. .....Annandale
Rousseau, Victor ....Maple Lake
Roholt, C. L. .....Waverly
Shrader, E. E. .....Watertown
Werner, O. S.....South Haven

Meeker County Medical Society

Annual meeting, December

President
Sturre, J. H.....Watkins
Secretary
Danielson, K. A. .....Litchfield

Brigham, Frank .....Watkins
Cutts, G. A. C.....Litchfield
Danielson, K. A.....Litchfield
Dulude, S.....Dassel
French, H. S.....Grove City
O'Connor, D. C.....Eden Valley
Peterson, Alfred .....Dassel
Robertson, A. W.....Litchfield
Robertson, W. P.....Litchfield
Sturre, J. R. .....Watkins

Stearns-Benton County Medical Society

Regular meetings, third Thursday in January, April, July and October
Annual meeting, third Thursday in April

President
Watson, Tolbert .....Albany
Secretary
Libert, J. N.....St. Cloud

Ausman, Carl F. .....Paynesville
Beebe, W. L. .....St. Cloud
Beaty, James H. .....St. Cloud
Boehm, John C. .....St. Cloud
Brigham, C. F.....St. Cloud
Clark, Harry B.....St. Cloud
Du Bois, Julian A...Sauk Center
Du Bois, Julian F....Sauk Center
Freeman, W. L. .....Foley
Friesleben, Wm. ....Sauk Rapids
Gulde, W. C.....St. Cloud
Hempstead, Werner ....St. Cloud
Holdridge, G. A.....Foley
Kern, M. J.....St. Cloud
Kingsbury, E. M.....Clearwater
Kohler, D. W.....St. Joseph
Kuhlman, Aug. .....Melrose
Lewis, E. J. .....Sauk Center
Lewis, C. B.....St. Cloud
Libert, J. N.....St. Cloud
McDowell, J. P. .....St. Cloud
May, C. E. .....
Masonic Temple, Minneapolis
Meyer, A. A.....Melrose
Moynihan, And. F...Sauk Center
McKibben, H. E..... St. Cloud
Pfaff, E. K.....Richmond
Pilon, P. C. .....Paynesville
Putney, George E.....Paynesville
Rathbun, A. M.....Rice
Rathbun, C. A.....Sauk Rapids
Rice, G. D. .....St. Cloud
Ridgeway, Alex. .....Belgrade
Richter, E. H.....Hunter, N. D.
Sherwood, G. E.....Kimball
Sutton, Chas. S.....St. Cloud
Sweetman, R. H.....Sauk Center
Watson, Tolbert.....Albany
Wolner, Oscar H.....Gilbert

Kandiyohi-Swift County Medical Society

Regular meetings, first Thursday in March, June, September and December
Annual meeting, first Thursday in December

President
Jacobs, Jno. C.....Willmar
Secretary
Scofield, C. L.....Benson

Anderson, R. E.....Willmar

Benson, I. S. .....Willmar
Branton, A. F. .....Willmar
Branton, B. J. .....Willmar
Daignault, O. .....Benson
Davison, P. C. .....Willmar
Dawswell, W. J.....Benson
Freeman, George H.....Willmar
Frost, E. H. .....Willmar
Hanson, H. V. .....Willmar
Jacobs, Jno. C. .....Willmar
Johnson, H. .....Kerkhoven
Kolset, Carl D.....Benson
Rains, John M. .....Willmar
Scofield, C. L. .....Benson

FIFTH DISTRICT

COUNCILOR, H. M. WORKMAN (3 years).....Tracy

Camp Release District Medical Society

Renville, Chippewa, Lac Qui Parle, Yellow Medicine and Sibley Counties
Regular meetings, fourth Thursday in January, April, July and October
Annual meeting, fourth Thursday in October

President
Adams, R. C. .....Bird Island
Secretary
Peterson, H. E. ....Granite Falls

Adams, R. C. .....Bird Island
Aldrich, F. H.....Belview
Bacon, R. S.....Montevideo
Barfield, J. J. .....Granite Falls
Bergh, L. N. .....Montevideo
Brand, W. A.....Redwood Falls
Burns, M. A. .....Milan
Bushey, M. E. .....Arlington
Clay, E. M.....Renville
Cole, H. B.....Redwood Falls
Crandall, A. M.....Madison
Cress, E. E. .....Boyd
Eisengraeber, G. A..Granite Falls
Englehart, P. C.....Wood Lake
Ferguson, J. B.....St. Paul
Flinn, B. P. .....Redwood Falls
Flinn, T. E. .....Redwood Falls
Frisch, Frank P.....Gibbon
Gaines, E. C.....Buffalo Lake
Guyer, L. G.....St. Paul
Hauge, M. M.....Clarkfield
Holmberg, L. J.....Canby
Johnson, C. M. .....Dawson
Johnson, H. M. .....Dawson
Jones, R. N. .....Gaylord
Lee, W. N.....Madison
Lima, Ludvig .....Montevideo
Mesker, G. H. .....Olivia
Nelson, N. A. .....Dawson
Olson, W. P. .....Gaylord
Passer, A. A. .....Olivia
Penhall, F. W.....Morton
Peterson, H. E.....Granite Falls
Puffer, F. L.....Bird Island
Selle, Fred .....Winthrop
Sherman, H. T.....Franklin
Smith, L. G. .....Montevideo
Stemsrud, A. A.....Dawson
Walker, G. H.....Minneapolis
Westby, N. .....Madison
Zimbeck, R. D.....Maynard

Redwood-Brown County Medical Society

Annual meeting, June

President
Jamieson, Earl ....Walnut Grove
Secretary
Meierding, Wm. A.....Springfield

Adams, J. L.....Morgan
Borgeson, Egbert.....Hanska
Cosgriff, J. A.....Lamberton
Dubbe, F. H.....New Ulm
Eckstein, A. W.....Comfrey
Ekelund, C. F.....New Ulm
Fritsche, A.....New Ulm
Fritsche, L. A.....New Ulm
Gray, F. D.....Marshall
Hammermeister, Theo. F. .....
New Ulm
Haskins, J. L.....Northfield
Jamieson, Earl ....Walnut Grove
Juergens, H. M.....Sanborn
Kiefer, M. A.....Sleepy Eye
Meierding, Wm. A.....Springfield
Pelant, F. J.....New Ulm
Peterson, R. A.....Vesta
Reinecke, George F.....New Ulm
Rothenburg, J. C.....Springfield
Schoch, J. L.....New Ulm
Seifert, Otto J.....New Ulm
Shrader, J. S.....Springfield
Strickler, A. F.....Sleepy Eye
Strickler, Mary .....Sleepy Eye
Strickler, O. C.....New Ulm
Vogel, Jos. H.....New Ulm
Vogtel, M. A.....Minneapolis
Walker, C. C. .....Raymond
Weiser, Geo. B.....New Ulm
Wellcome, J. W. B.....Sleepy Eye

Lyon-Lincoln County Medical Society

Regular meetings, first Tuesday in March, May and July
Annual meeting, October

President
Robertson, J. B.....Cottonwood
Secretary
Workman, H. M.....Tracy

Akester, Ward.....Marshall
Bossingham, O. N....Lake Benton
Engh, Sigfred .....Cottonwood
Germo, Chas. .....Balaton
Hoidale, A. D. .....Tracy
Jacobsen, David J.....Russell
Jacquot, G. L.....Tyler
Jensen, J. C.....Hendricks
Persons, C. E.....Marshall
Robertson, J. B.....Cottonwood
Sanderson, E. T.....Minneota
Thordarson, Theo. .....Minneota
Vadheim, A. L.....Tyler
Valentine, W. H. .....Tracy
Workman, H. M. .....Tracy
Workman, W. G.....Tracy

SIXTH DISTRICT

COUNCILOR, F. R. WEISER (1 year).....Windom

Southwestern Minnesota Medical Society

Pipestone, Rock, Murray, Nobles, Cottonwood, Jackson Counties
Regular meetings, May and October
Annual meeting, October

President
Metcalf, F. W.....Fulda
Secretary
Piper, Wm. A.....Mountain Lake

Arnold, E. W. .....Adrian
Balcom, G. G.....Lake Wilson
Bong, J. H. .....Jasper
Brown, A. H. .....Pipestone
Chadbourn, A. G.....Heron Lake
Cress, P. J.....Ellsworth
De Boer, Herman.....Edgerton
Ditmeier, L. M. Gerber....Jasper
Dolan, C. P. .....Worthington
Doms, H. C. .....Slayton
Doms, Wm.....Woodstock
Dudley, J. H.....Windom
Golden, C. M.....Tyler
Halloran, Walter .....Jackson
Hilger, J. M.....Iona
Hitchings, W. S.....Lakefield
Johnson, Ellsworth .....Windom
Keeling, F. L. .....Lakefield
Leigh, H. J. .....Lakefield
Lowe, Thos. .....Pipestone
Lowe, Thos. A.....Slayton
McCrea, Jas. .....Fulda
McKeown, E. G. .....Pipestone
Manson, F. M.....Worthington
May, C. C. .....Adrian
Metcalf, F. W.....Fulda
Mork, B. O.....Worthington
Nusbaum, W. H.....Jackson
Patterson, W. E.....Westbrook
Piper, Wm. A.....Mountain Lake
Portman, W. C.....Jackson
Richardson, W. E.....Pipestone
Richmond, Chas. D.....Jeffers
Rose, J. F. .....Lakefield
Sherman, C. L. .....Luverne
Slater, S. A. .....Worthington
Smallwood, J. F.....Worthington
Sogge, L. .....Windom
Stanley, C. R. .....Worthington
Taylor, Wm. J. .....Pipestone
Thorson, E. O. .....Luverne
Tiedeman, I. D.....Heron Lake
Tofte, Josephine .....Minneapolis
Waller, Jas. D.....Wilmont
Watson, F. G.....Worthington
Weiser, F. R.....Windom
Williams, L. A.....Slayton
Wright, C. O.....Luverne

Blue Earth Valley Medical Society

Martin and Faribault Counties
Regular meetings, 4th Thursday, May and October
Annual meeting, May

President
Wilson, C. E.....Blue Earth
Secretary
Hunt, R. C. .....Fairmont

Anderson, S. H.....Wells
Bailey, H. B. .....Ceylon
Best, F. E.....Wells
Broberg, J. A.....Blue Earth
Butz, J. A.....Monterey
Chambers, W. C.....Blue Earth
Dewey, G. W.....Fairmont
Farrish, R. C.....Sherburn
Gough, W. H.....Granada
Henderson, A. J.....Kiester
Holm, P. .....Wells
Herman, S. .....Welcome
Hunt, F. N. .....Fairmont
Hunt, R. C. .....Fairmont
Hunte, A. F.....Truman
Jacobs, A. C.....Elmore
Johnson, H. P.....Fairmont
Logan, F. W.....Blue Earth
Lowe, R. C.....Fairmont
Luedtke, G. H.....Fairmont
McGroarty, J. J. .....Easton
Mills, J. W. .....Winnebago City
Richardson, W. J.....Fairmont
Sybilrud, H. W.....Bricelyn
Silvernale, F. P.....Elmore
Wilson, C. E.....Blue Earth

Watonwan County Medical Society

Annual meeting, December

President
Ternstrom, O. H.....St. James
Secretary
Grimes, H. B.....Madelia

Grimes, H. B.....Madelia
Hagen, O. E.....Butterfield
Kabrick, O. A.....Odin
McCarthy, W. J.....Madelia
Rowe, W. H. .....St. James
Ternstrom, O. H.....St. James
Thompson, Albert .....St. James

SEVENTH DISTRICT

COUNCILOR, F. A. DODGE, M. D. (2 years) ..... Le Sueur

Nicollet-Le Sueur County Medical Society

Regular meetings, June, September and December
Annual meeting, December

President
Behmler, Fred. W. ..... Lafayette

Secretary
Le Clerc, J. E. ..... Le Sueur

Aitkens, H. B. ... Le Sueur Center
Baskett, Geo. T. ..... St. Peter
Baskett, Olive T. ..... St. Peter
Behmler, Fred W. ..... Lafayette
Covell, W. W. ..... St. Peter
Daniels, J. W. ..... St. Peter
Dodge, F. A. ..... Le Sueur
Ericson, S. ..... Le Sueur
Fisher, J. M. ..... St. Peter
Hartung, H. A. ..... Le Sueur
Le Clerc, J. E. ..... Le Sueur
McDougald, D. W. ..... Long Island, N. Y.
Mellicke, W. A. ..... Nicollet
Phelps, R. M. ..... St. Peter
Strathern, F. P. ..... St. Peter
Wentworth, L. F. Le Sueur Center

McLeod County Medical Society

Regular meetings, January, April, July and October
Annual meeting, January

President
Schmidt, W. R. ..... Glencoe

Secretary
Axilrod, D. L. ..... Hutchinson

Axilrod, D. L. ..... Hutchinson
Clement, J. B. ..... Lester Prairie
Clair, J. B. ..... Winsted
Holm, H. H. ..... Glencoe
Jellison, E. R. ..... New Auburn
Klima, W. W. ..... Stewart
Kohler, F. G. ..... Hector
Langhoff, A. H. ..... Glencoe
Lund, Theo. C. ..... Hutchinson
Schmidt, W. R. ..... Glencoe
Scholpp, O. W. ..... Hutchinson
Sheppard, Fred ..... Hutchinson
Sheppard, P. E. ..... Hutchinson

Scott-Carver Medical Society

Regular meetings, first Thursday in March, June, September and December
Annual meeting, first Thursday in December

President
Von Bohland, F. J. ..... Belle Plaine

Secretary
Reiter, H. W. ..... Shakopee

Buck, Fred H. ..... Shakopee
Fischer, H. P. ..... Shakopee
Fischer, P. M. ..... Shakopee
Henriksen, H. G. ..... Elko
Landenberger, John .. New Prague
McKeon, James ..... St. Paul
Maertz, W. F. ..... New Prague
Moloney, G. R. ..... Belle Plaine
Novak, Edw. E. ..... New Prague
Phillips, Wm. H. ..... Jordan
Proshek, Chas. E. ..... Chicago
Reiter, H. W. ..... Shakopee
Schneider, H. A. ..... Jordan
Von Bohland, F. J. ..... Belle Plaine
White, J. B. ..... Belle Plaine

Goodhue County Medical Society

Annual meeting first Tuesday in January

President
Conley, Alva. A. ..... Cannon Falls

Secretary
Werner, N. L. ..... Red Wing

Aanes, A. M. ..... Red Wing
Anderson, J .V. ..... Red Wing
Beyer, A. G. ..... Red Wing
Claydon, L. E. ..... Red Wing
Conley, Alva. ..... Cannon Falls
Cremer, M. H. ..... Red Wing
Gausemel, S. D. ..... Goodhue
Johnson, A. E. ..... Red Wing
Jones, A. W. ..... Red Wing
McGuigan, H. T. ..... Red Wing
Sawyer, H. P. ..... Red Wing
Smith, M. W. ..... Red Wing
Steffens, L. A. ..... Red Wing
Werner, N. L. ..... Red Wing

Rice County Medical Society

Regular meetings quarterly as called
Annual meeting, December

President
Mayland, M. L. ..... Faribault

Secretary
Robilliard, C. M. ..... Faribault

Babcock, F. M. ..... Northfield
Davis, F. U. ..... Faribault
Errickson, W. A. ..... Faribault
Field, Merton ..... Northfield
Haessly, S. B. ..... Faribault
Hanson, A. M. ..... Faribault
Huxley, F. R. ..... Faribault
Kanne, C. W. ..... Faribault
Lee, W. P. ..... Northfield
Lexa, F. J. ..... Lonsdale
Mayland, M. L. ..... Faribault
Morse, W. E. H. ..... Morristown
Moses, Joseph, Jr. ..... Northfield
Plonske, C. J. ..... Faribault
Robilliard, C. M. ..... Faribault
Robilliard, W. H. ..... Faribault
Rumpf, C. W. ..... Faribault
Rumpf, W. H. ..... Faribault
Smith, P. A. ..... Faribault
Theissen, W. H. ..... Faribault
Traeger, C. A. ..... Faribault
Warren, F. S. ..... Faribault
Wilson, Warren ..... Northfield

Wabasha County Medical Society

Regular meetings, annually first Thursday after first Monday in July

President
Sutton, L. F. ..... Mazeppa

Secretary
Wilson, W. F. ..... Lake City

Bayley, E. H. ..... Lake City
Bowers, H. E. ..... Lake City
Branyan, Hugo ..... Wabasha
Cochrane, W. J. ..... Lake City
Dempsey, D. P. ..... Kellogg
Fleischhauer, D. S. ..... Wabasha
French, E. A. ..... Plainview
Radabaugh, R. C. ..... Hastings
Replogle, W. H. ..... Wabasha
Schmidt, G. ..... Lake City
Slocumb, J. A. ..... Plainview
Sutton, L. F. ..... Mazeppa
Wilson, W. F. ..... Lake City

EIGHTH DISTRICT

COUNCILOR, W. F. BRAASCH, M. D. (1 year) ..... Rochester

Blue Earth County Medical Society

Regular meetings, last Monday in each month
Annual meeting, last Monday in December

President
Liedloff, A. G. ..... Mankato

Secretary
Snell, A. M. ..... Mankato

Andrews, John W. ..... Mankato
Andrews, Roy N. ..... Mankato
Arnold, James E. .. Vernon Center
Benham, Edward W. ..... Mankato
Black, William ..... Mankato
Dahl, Gerhard A. ..... Mankato
Denman, Austin V. ..... Mankato
Edwards, Ralph T. ..... Elysian
Franchere, Fred W. .. Lake Crystal
Hielscher, Helen H. ..... Mankato
Hielscher, Julian A. ..... Mankato
Holbrook, John S. ..... Mankato
Holman, Carl J. ..... Mankato
James, John H. ..... Mankato
Kelly, Thos. C. ..... Mankato
Kemp, Alphonse F. ..... Mankato
Liedloff, Adolph G. ..... Mankato
Lloyd, Hiram J. ..... Mankato
Merrill, James E. ..... Amboy
Miller, Victor ..... Mankato
O'Connor, Patrick H. ..... Amboy
Osborn, Lida ..... Mankato
Pratt, Chelsea C. ..... Mankato
Schlesselman, George ..... Good Thunder
Schlesselman, J. T. ..... Mankato
Snell, Albert M. ..... Mankato
Sohmer, Alphonse E. J. .. Mankato
Wentworth, Albert J. ... Mankato
Williams, Hugh O. ..... Mankato
Williams, John ..... Lake Crystal

Houston-Fillmore County Medical Society

No regular meetings
Annual meeting, October

President
Helland, G. M. ..... Houston

Secretary
Fischer, O. F. ..... Houston

Anderson, Norman E. ... Harmony
Browning, W. E. ..... Caledonia
Christianson, H. W. ..... Wykoff
Collins, J. S. ..... Wabasha
Drake, F. A. ..... Lanesboro
Eby, Cyrus B. ..... Spring Valley
Fischer, O. F. ..... Houston
Helland, G. M. ..... Spring Grove
Helland, J. W. ..... Spring Grove
Johnson, C. H. ..... Spring Valley
Kibbe, O. A. ..... Canton
Kierland, P. E. ..... Harmony
Lannin, J. C. ..... Mabel
Love, Geo. A. ..... Preston
Nass, H. A. ..... Mabel
Nelson, M. S. ..... Spring Grove
Onsgard, C. K. ..... Halstad
Onsgard, L. K. ..... Houston
Rhines, D. C. ..... Caledonia
Sather, E. R. ..... Spring Valley
Tierney, C. M. ..... Granger
Williams, R. V. ..... Rushford
Utley, J. D. ..... Glendale, Cal.

Mower County Medical Society

Regular meetings, last Thursday of every month
Annual meeting, November

President
Coleman, F. B. ..... Austin

Secretary
Lommen, P. A. ..... Austin

Allen, A. W. ..... Austin
Baker, C. C. ..... Austin
Cobb, Willis F. ..... Lyle
Coleman, F. B. ..... Austin
Grise, W. B. ..... Austin
Hegge, C. A. ..... Austin
Hegge, O. H. ..... Austin
Henslin, A. E. ..... LeRoy
Hertel, G. A. ..... Austin
Leck, C. C. ..... Austin
Lommen, P. A. ..... Austin
Melzer, G. R. ..... Lyle
Mitchell, R. S. ..... Grand Meadow
Morris, E. H. ..... Austin
Morse, M. P. ..... LeRoy
Peirson, H. F. ..... Austin
Shipley, H. M. ..... Adams
Shottler, G. J. ..... Dexter
Torkelson, P. T. ..... Lyle
Warren, C. L. ..... LeRoy

Dodge County Medical Society

No regular meetings
Annual meeting in August

President
Harrison, E. E. ..... West Concord

Secretary
Bigelow, C. E. ..... Dodge Center

Baker, Amos L. ..... Kasson
Belt, Wallace E. ... Dodge Center
Bigelow, Chas. E. .. Dodge Center
Clifford, Frank F. .. West Concord
Flores, O. T. ..... Dodge Center
Harrison, Elmer E. West Concord
Smith, Frank D. ..... Kasson
Way, Osman F. ..... Claremont

Olmsted County Medical Society

Regular meetings, second Wednesday in April, June, September and December
Annual meeting, second Wednesday in December

President
Sistrunk, W. E. ..... Rochester

Secretary
Piper, M. C. ..... Rochester

Abrams, W. D. ..... Rochester
Adams, S. Franklin ..... Rochester
Adson, Alfred W. ..... Rochester
Allen, Wilson A. ..... Rochester
Amberg, Samuel ..... Rochester
Anderson, C. M. ..... Rochester
Andrews, C. F. ..... Rochester
Asbury, J. T. ..... Rochester
Balfour, Donald C. ..... Rochester
Barborka, C. J. ..... Rochester
Barnes, A. R. ..... Rochester
Barrier, Chas. W. ..... Rochester
Behn, Claud W. ..... Rechester
Benedict, William L. ..... Rochester
Benjamin, W. G. ..... Rochester
Bergen, Ralph D. ..... Rochester
Berkman, David M. ..... Rochester
Bleifus, Walter F. ..... Rochester
Bonta, M. B. ..... Rochester
Boothby, Walter M. ..... Rochester
Bowing, Harry H. ..... Rochester
Bowler, John Pollard ... Rochester
Braasch, William F. ..... Rochester
Bradley, E. L. ..... Rochester
Broders, Albert C. ..... Rochester
Brown, George E. ..... Rochester
Brown, P. W. ..... Rochester
Brown, R. O. ..... Rochester
Bryan, A. W. ..... Rochester
Bueerman, Winifred Henry ..... Rochester
Buie, L. A. ..... Rochester
Bumpus, Herman C. ..... Rochester
Burden, Verne G. ..... Rochester
Burns, J. G. ..... Rochester
Burns, R. E. ..... Rochester
Camp, John Dexter ..... Rochester
Carman, Russell Daniel. Rochester
Cathcart, E. P. ..... Rochester
Chaney, W. C. ..... Rochester
Conner, H. M. ..... Rochester
Craig, Wm. McK. ..... Rochester
Crawford, Albert S. ..... Rochester
Crenshaw, John L. ..... Rochester
Crewe, John E. ..... Rochester
Culligan, J. M. ..... Rochester
Davis, Kenneth S. ..... Rochester
Desjardins, Arthur U. .. Rochester
Dolder, Felix C. ..... Eyota
Doyle, J. B. ..... Rochester
Drips, D. G. ..... Rochester
Dunlap, H. F. ..... Rochester
Eager, B. F. ..... Rochester
Ebert, Joseph William .. Rochester
Eusterman, Geo. B. ..... Rochester
Evarts, Arrah B. ..... Rochester
Fawcett, Chas. E. ..... Stewartville
Figi, F. A. ..... Rochester
Fineman, S. ..... Rochester
Finney, W. P. ..... Rochester
Ford, Frances A. ..... Rochester
Foucar, H. O. ..... Rochester
Foulds, Gordon S. ..... Rochester
Fowler, L. H. ..... Rochester
Frazer, E. B. ..... Rochester
Freed, C. F. ..... Rochester
Gaarde, Fred W. ..... Rochester
Garvin, John Day ..... Rochester
Giffin, H. Z. ..... Rochester
Goeckerman, W. H. ..... Rochester
Graham, Christopher ... Rochester
Granger, G. Booker .... Rochester
Granger, Charles T. ..... Rochester
Green, Carl Hartley .... Rochester
Greenfield, William J. ... Rochester
Haines, S. F. ..... Rochester
Hallberg, C. A. ..... Rochester

Hallenbeck, Dorr F....Rochester
Hansel, French Keller..Rochester
Hanson, W. Arthur.....Rochester
Hardt, L. L.....Rochester
Harrington, S. W.....Rochester
Hartman, Howard R....Rochester
Hedblom, Carl A.....Rochester
Helmholz, H. F.....Rochester
Hempstead, B. E.....Rochester
Hench, Philip S.....Rochester
Henderson, Melvin S....Rochester
Herbst, William P.....Rochester
Heyerdale, Oscar C.....Rochester
Hundling, H. W.....Rochester
Hunt, Verne C. .....Rochester
Hutchinson, C. J.....Rochester
Hyer, C. A.....Rochester
Jackson, George H.....Rochester
Jameson, Carol E.....Rochester
Jepson, P. N.....Rochester
Johnson, A. C.....Rochester
Jones, H. T.....Rochester
Joseph, E. G.....Rochester
Joyce, George T.....Rochester
Judd, Edward Starr....Rochester
Keith, N. M.....Rochester
Kent, George B.....Rochester
Kilbourne, Arthur F....Rochester
Koucky, J. D.....Rochester
Lange, A. E.....Rochester
Lemon, Willis S.....Rochester
Lillie, Harold I.....Rochester
Lillie, Walter I.....Rochester
Linton, William B.....Rochester
Logan, Archibald H.....Rochester
Long, W. H.....Rochester
Luden, Georgine .....Rochester
Lyons, Horace R.....Rochester
Lyons, John H.....Rochester
Lyons, Shirley C.....Rochester
McCorvie, J. E.....Rochester
McFarland, Albert R....Rochester
McGuire, L. D.....Rochester
McKaig, Carle B.....Rochester
McVicar, Chas. S.....Rochester

Magath, T. B.....Rochester
Mahle, A. E.....Rochester
Malloy, J. F.....Rochester
Masson, D. M.....Rochester
Masson, James C.....Rochester
Mayo, Charles H. .....Rochester
Mayo, William J. .....Rochester
Mebane, Donald Cummins .....
Rochester
Meeker, W. R.....Rochester
Melson, Oliver C.....Rochester
Merrill, U. H.....Rochester
Meyerding, Henry W...Rochester
Mitchell, J. I.....Rochester
Moench, Laura Mary...Rochester
Moersch, Frederick P...Rochester
Moersch, H. J.....Rochester
Moore, Alex. B.....Rochester
Moore, T. D.....Rochester
Moran, Robert E.....Rochester
Mussey, Robert B.....Rochester
Nagel, G. W.....Rochester
Nesbit, Harold T.....Rochester
New, Gordon B.....Rochester
Ohlinger, Lorin B.....Rochester
O'Leary, Paul A.....Rochester
Ott, William O.....Rochester
Pardee, Katherine.....Rochester
Parker, B. R.....Rochester
Parker, H. L.....Rochester
Parker, J. William....Rochester
Pemberton, John deJ....Rochester
Peterman, M. G.....Rochester
Peterson, Willard C...Minneapolis
Piper, Monte C.....Rochester
Plankers, A. G.....Rochester
Plummer, H. S.....Rochester
Plummer, W. A.....Rochester
Pollock, Lee W.....Rochester
Powell, L. D.....Rochester
Prangen, Avery D.....Rochester
Proctor, O. S.....Rochester
Pulford, DeLos Schuyler (Jr.)
Rochester
Rankin, F. W.....Rochester

Rice, G. E.....Rochester
Rivers, A. B.....Rochester
Robertson, H. E.....Rochester
Rockwood, Paul Reed..Rochester
Rosenow, Edward C.....Rochester
Rowntree, L. G.....Rochester
Russell, Herman R.....St. Paul
Sanford, Arthur H.....Rochester
Sargeant, Howard L....Rochester
Scholl, A. J.....Rochester
Schoonover, F. S.....Rochester
Seed, Lindon .....Rochester
Senty, E. G.....Rochester
Shaffer, Loren W.....Rochester
Sheldon, Walter D.....Rochester
Sistrunk, Walter E.....Rochester
Smith, F. L.....Rochester
Smiley, K. E.....Rochester
Snyder, J. W.....Rochester
Sprunt, William H.....Rochester
Stacy, Leda June.....Rochester
Stark, W. B.....Rochester
Steven, George .....Byron
Stevens, J. B.....Rochester
Stewart, L. A. S. .....
.....Ottawa, Ontario, Canada
Stokes, John H.....Rochester
Struthers, J. E.....Rochester
Sutherland, C. G.....Rochester
Swan, Theo. S. .....Rochester
Szlapka, T. L.....Rochester
Taylor, R. V.....Rochester
Vinson, Porter P.....Rochester
Von Lackum, W. H.....Rochester
Wagener, H. P.....Rochester
Walters, Henry Waltman .....
Rochester
Weir, J. F.....Rochester
Wilder, Russell M.....Rochester
Wilhelm, L. F. X.....Rochester
Wilkins, J. A.....Rochester
Willius, Frederick A....Rochester
Wilson, Louis B.....Rochester
Witherstine, H. H.....Rochester
Woltman, Henry W. F...Rochester

Waseca County Medical Society

Annual meeting, December

President
Miller, H. A.....Waseca

Secretary
Gallagher, B. J.....Waseca

Blanchard, H. G.....Waseca
Brandenberg, F. D..New Richland
Chamberlin, W. A.....Waseca
Cory, W. M.....Waterville
Gallagher, B. J.....Waseca
Hagen, H. O.....New Richland

Lynn, J. F.....Waseca
McIntire, H. M.....Waseca
Miller, H. A.....Waseca
O'Hara, J. J.....Janesville
Swartwood, F. A.....Waseca
Joyce, T. M.....Janesville

Winona County Medical Society

Regular meetings, first Tuesday in January, April, July, October
Annual meeting in January

President
Steiner, J. W.....Winona

Secretary
Robbins, C. P.....Winona

Benoit, F. T.....Winona
Clay, F. H.....St. Charles
Heise, W. F. C.....Winona

Keyes, E. D.....Winona
Leicht, O. .....Winona
Lichtenstein, H. .....Winona
Lindsay, W. V.....Winona
Lynch, J. L.....Winona
McLaughlin, E. M.....Winona
Nauth, W. H.....Winona
Neumann, C. A.....Lewiston
Neumann, W. H.....Lewiston

Pritchard, D. B.....Winona
Risser, E. D.....Winona
Robbins, C. P.....Winona
Rosenberry, B. P.....Winona
Schaefer, S. .....Winona
Scott, J. N.....St. Charles
Steiner, J. W.....Winona
Tweedy, G. J.....Winona
Wilson, C. E.....Dakota

Freeborn County Medical Society

Regular meetings upon call of members
Annual meeting, November

President
Von Berg, J. P.....Albert Lea

Secretary
Folken, F. G.....Albert Lea

Burns, H. D.....Albert Lea
Buturff, C. R.....Freeborn
Calhoun, F. W.....Albert Lea
Folken, F. G.....Albert Lea
Freeman, J. R.....Glenville
Gamble, J. W.....Albert Lea
Gullixson, A. .....Albert Lea

Kamp, B. A.....Albert Lea
Nannestad, J. R.....Albert Lea
Palmer, W. L.....Albert Lea
Shultz, J. A.....Albert Lea
Stewart, O. E.....Albert Lea
Vollum, E. O.....Albert Lea
Von Berg, J. P.....Albert Lea

Steele County Medical Society

Regular meetings, second alternate Tuesday of each month
Annual meeting, December

President
Smersh, J. F.....Owatonna

Secretary
Hart, A. B.....Owatonna
Adair, J. H.....Owatonna
Andrist, J. W.....Owatonna

Daily, W. J.....Blooming Prairie
Ertel, E. Q.....Ellendale
Hart, A. B.....Owatonna
McIntyre, J. A.....Owatonna
Melby, B. .....Blooming Prairie
Morehouse, G. G.....Owatonna
Peterson, C. .....Owatonna

Quigley, T. C.....Owatonna
Senn, E. W.....Owatonna
Smersh, F. M.....Owatonna
Smersh, J. F.....Owatonna
Stewart, A. B.....Owatonna
Thimsen, N. C..Blooming Prairie
Warren, J. W.....Faribault

ALPHABETICAL ROSTER

Aanes, A. M.....Red Wing
Abbott, A. W.....Minneapolis
Abbott, J. S.....St. Paul
Abbott, Wm. P.....Duluth
Aborn, W. H.....Hawley
Abramovich, J. H.....St. Paul
Abrams, W. D.....Rochester
Adair, F. L.....Minneapolis
Adair, J. H.....Owatonna
Adams, B. S.....Hibbing
Adams, J. L.....Morgan
Adams, R. C.....Bird Island
Adams, S. Franklin, ...Rochester
Adson, A. W.....Rochester
Ahrens, A. E.....St. Paul
Ahrens, A. H.....St. Paul
Aitkens, H. B.....Le Sueur Center
Akester, Ward.....Marshall
Alden, J. F.....St. Paul
Aldes, Harry .....St. Paul
Aldrich, F. H.....Belview
Alexander, F. H.....St. Paul
Alger, E. W.....Minneapolis
Aling, C. P.....Minneapolis
Allen, A. W.....Austin
Allen, Chas. C.....Austin
Allen, F. H.....Staples
Allen, H. W.....Minneapolis
Allen, Mason .....St. Paul
Allen, W. A.....Rochester
Allison, R. G.....Minneapolis
Almquist, H. E.....Minneapolis
Amberg, Samuel.....Rochester
Ancker, A. B.....St. Paul
Anderson, A. E.....Minneapolis
Anderson, A. G.....Minneapolis
Anderson, C. M.....Rochester
Anderson, David D....Minneapolis
Anderson, Edward Dyer .....
Minneapolis
Anderson, Hilding C.....Duluth
Anderson, J. K.....Oak Terrace
Anderson, J. V.....Red Wing
Anderson, Norman E....Harmony
Anderson, R. E.....Willmar
Anderson, S. H.....Wells
Andres, R. G.....St. Paul
Andrews, C. F.....Rochester
Andrews, J. W.....Mankato
Andrews, R. N.....Mankato
Andrist, J. W.....Owatonna
Annis, H. B.....Minneapolis
Archibald, Frank M....Mahnomen
Arey, H. C.....Excelsior
Arminen, K. V.....Duluth
Armstrong, E. L.....Duluth
Armstrong, J. M.....St. Paul
Arnold, E. W.....Adrian
Arnold, James E..Vernon Center
Arnson, J. M.....Graceville
Arouni, Khalil.....St. Paul
Arzt, C. P.....St. Paul
Asbury, J. T.....Rochester
Athens, A. S.....Buhl
Aune, Martin .....Minneapolis
Aurand, W. H.....Minneapolis
Aurness, P. A.....Minneapolis
Ausman, C. F.....Paynesville
Avery, J. Fowler ....Minneapolis
Axilrod, D. L.....Hutchinson
Aylmer, A. L.....Minneapolis
Ayres, G. T.....Ely
Babcock, F. M.....Northfield
Bacon, Donald K.....St. Paul
Bacon, Knox.....St. Paul
Bacon, L. C.....St. Paul
Bacon, R. S.....Montevideo
Badeaux, G. I.....Brainerd
Bagley, W. R.....Duluth
Baier, Florence C....Minneapolis
Bailey, H. B.....Ceylon
Baker, A. C.....Fergus Falls
Baker, A. L.....Kasson
Baker, Alfred T.....Minneapolis
Baker, E. L.....Minneapolis
Baker, H. A.....Minneapolis
Baker, Looe .....Minneapolis
Bakke, O. H.....Minneapolis
Balcom, G. G.....Lake Wilson
Balcome, F. E.....St. Paul
Baldwin, L. B.....Minneapolis
Balfour, D. C.....Rochester
Ball, C. R.....St. Paul
Barber, J. P.....Minneapolis
Barborka, C. J.....Rochester
Barfield, J. J.....Granite Falls
Barnes, A. R.....Rochester
Barney, L. A. .....Duluth
Barrett, Fred .....Gilbert
Barrier, Chas. W.....Rochester
Barron, Moses .....Minneapolis
Barry, L. W.....St. Paul
Barsness, Nellie .....St. Paul
Baskett, George T.....St. Peter
Baskett, Olive T.....St. Peter
Bass, G. W.....Minneapolis
Bates, B. V.....Wheaton
Baxter, S. H.....Minneapolis
Bayley, E. H.....Lake City
Beadie, W. D.....St. Paul
Beals, Hugh .....St. Paul
Beard, Archie H.....Minneapolis
Beaty, J. H.....St. Cloud
Beckley, F. L.....St. Paul
Bedford, E. W.....Minneapolis
Beebe, W. L.....St. Cloud
Behmler, Fred W.....Lafayette
Behn, Claud W. .....Rochester
Beise, R. A.....Brainerd
Bell, C. C.....St. Paul
Bell, J. W. .....Minneapolis
Bell, J. W., Jr.....Minneapolis
Belt, W. E.....Dodge Center
Benedict, E. E.....Minneapolis
Benedict, W. L.....Rochester
Benepe, L. M.....St. Paul
Benham, E. W.....Mankato
Benjamin, A. E.....Minneapolis
Benjamin, W. G.....Rochester
Benn, F. G.....Minneapolis
Bennion, P. H.....St. Paul
Benoit, F. T.....Winona
Benson, F. S.....Willmar
Benson, Geo. E.....Minneapolis
Benson, R. D.....Minneapolis
Bentley, Norman P.....St. Paul
Berge, H. M.....Twin Valley
Bergen, Ralph D. .....Rochester
Bergh, L. N.....Montevideo
Bergheim, M. C.....Hawley
Bergquist, K. E.....Duluth
Berkman, D. M.....Rochester
Berrisford, Paul D.....St. Paul
Bessesen, A. N.....Minneapolis
Best, F. E.....Wells
Beyer, A. G.....Red Wing
Bigelow, C. E.....Dodge Center
Binet, H. E.....Grand Rapids
Binger, H. E.....St. Paul
Birnberg, T. L.....St. Paul
Bishop, Chas. Wesley..Minneapolis
Bissell, F. S.....Minneapolis
Black, Wm. .....Mankato
Blacklock, S. S.....Hibbing
Blake, Jas. .....Hopkins
Blakely, C. C.....Barnum
Blanchard, H. G.....Waseca
Bleifus, W. F.....Rochester
Bock, R. A.....St. Paul
Boeckmann, Eduard .....St. Paul
Boeckmann, Egil .....St. Paul
Bockman, M. W. H....Minneapolis
Boehm, J. C.....St. Cloud
Bohland, E. H.....St. Paul
Bohling, B. S.....Sandstone
Bole, R. S.....St. Paul
Boleyn, E. S.....Stillwater
Bolsta, Chas. .....Ortonville
Bolstad, H. C.....St. Paul
Boman, P. G.....Duluth
Bone, Merle .....Kelliher
Bong, J. H.....Jasper
Bonta, M. B.....Rochester
Booth, A. E.....Minneapolis
Boothby, W. M.....Rochester
Boreen, C. A.....Minneapolis
Borgeson, Egbert J.....Hanska
Bossingham, O. N....Lake Benton
Bosworth, Robinson .....St. Paul
Bottolfson, B. T.....Moorhead
Bouman, H. A.....Minneapolis
Bowers, H. E.....Lake City
Bowers, J. T....Thief River Falls
Bowing, H. H.....Rochester
Bowler, John Pollard..Rochester
Boyer, S. H. .....Duluth
Boysen, P. .....Pelican Rapids
Braasch, Wm. F.....Rochester
Brabec, F. J.....Perham
Braden, A. J.....Duluth
Bradley, E. L.....Rochester
Brand, G. D.....St. Paul
Brand, W. A.....Redwood Falls
Brandenberg, F. D..New Richland
Branton, A. F.....Willmar
Branton, B. J.....Willmar
Branyan, Hugo.....Wabasha
Bratrud, A. F.....Minneapolis
Bratrud, O. Edward.....Warren
Bratrud, Theodor .....Warren
Bratrude, E. J.....Sacred Heart
Bray, C. W.....Biwabik
Bray, E. R.....St. Paul
Briggs, F. W.....Duluth
Brigham, C. F.....St. Cloud
Brigham, Frank.....Watkins
Brimhall, J. B.....St. Paul
Broberg, J. A.....Blue Earth
Broders, A. C.....Rochester
Brodie, Walter D.....St. Paul
Broker, W. S.....Battle Lake
Brooks, G. F.....St. Paul
Brooks, Chas. N.....Minneapolis
Brooks, D. F.....St. Paul
Brown, A. E.....Stillwater
Brown, A. H.....Pipestone
Brown, Edgar D. .....Minneapolis
Brown, Ed. I.....St. Paul
Brown, Edw. J. .....Minneapolis
Brown, G. E.....Rochester
Brown, John C.....St. Paul
Brown, LeRoy.....St. Paul
Brown, Lyle L.....Crookston
Brown, P. W. .....Rochester
Brown, R. O.....Rochester
Brown, R. S.....Minneapolis
Brown, Silas E.....St. Paul
Browning, W. E.....Caledonia
Brunet, L. M.....Cloquet
Bryan, A. W.....Rochester
Buck, Fred H. .....Shakopee
Buckley, E. W.....St. Paul
Bueerman, Winifred Henry ....
Rochester
Buie, L. A.....Rochester
Bulkley, Kenneth ....Minneapolis
Bullen, F. W.....Hibbing
Bumpus, H. C.....Rochester
Burch, F. E.....St. Paul
Burden, Verne G.....Rochester
Burfiend, G. H.....St. Paul
Burnap, W. L.....Fergus Falls
Burns, H. D.....Albert Lea
Burns, F. W.....St. Paul
Burns, H. J.....Duluth
Burns, J. G.....Rochester
Burns, M. A.....Milan
Burns, R. E.....Rochester
Burns, R. L.....Two Harbors
Burns, R. M.....St. Paul
Buscher, H. .....St. Paul
Bushey, M. E.....Arlington
Butler, John .....Minneapolis
Butturff, C. R.....Freeborn
Butz, J. A.....Monterey
Byrnes, W. J.....Minneapolis
Cabot, V. S.....Minneapolis
Caine, C. E.....Morris
Calhoun, F. W.....Albert Lea
Calkins, L. A.....Minneapolis
Cameron, J. A.....St. Paul
Camp, John Dexter.....Rochester
Camp, W. E.....Minneapolis
Campbell, E. Paul.....St. Paul
Campbell, J. E.....South St. Paul
Campbell, L. M.....Minneapolis
Campbell, Robert ....Minneapolis
Cannon, C. N.....St. Paul
Cannon, Harry .....St. Paul
Carey, Jas. B.....Minneapolis
Carman, C. L.....St. Paul
Carman, Paul I.....St. Paul
Carman, Russell Daniel.Rochester
Carroll, Wm. C.....St. Paul
Carstens, C. F.....Hibbing
Cathcart, E. P.....Rochester
Catlin, John J.....Buffalo
Catlin, T. J.....Palisade
Cavanaugh, J. O.....St. Paul
Chadbourn, A. G....Heron Lake
Chamberlin, W. A.....Waseca
Chambers, W. C.....Blue Earth
Chandler, O. B.....St. Paul
Chaney, W. C.....Rochester
Chapman, T. L.....Duluth
Chatterton, C. C.....St. Paul
Cheleen, S. J.....Minneapolis
Cheney, E. L.....Duluth
Christenson, C. R.....Starbuck
Christenson, E. P....Two Harbors
Christiansen, A. .....St. Paul
Christianson, H. W.....Wykoff
Christie, G. R.....Long Prairie
Christison, J. T.....St. Paul
Churchill, A. G.....St. Paul
Cirkler, A. A.....Minneapolis
Clair, J. B.....Winsted
Clark, F. F.....Duluth
Clark, H. B.....St. Cloud
Clark, H. S.....Minneapolis

Clark, T. C.....Minneapolis
Clay, E. M.....Renville
Clay, F. H.....St. Charles
Claydon, L. E.....Red Wing
Clement, J. B.....Lester Prairie
Clifford, F. F.....West Concord
Cobb, S. A.....St. Paul
Cobb, Willis F.....Lyle
Cochrane, W. J.....Lake City
Colby, Woodward .....St. Paul
Cole, H. B.....Redwood Falls
Cole, Wallace H.....St. Paul
Coleman, F. B.....Austin
Collie, H. G.....St. Paul
Collins, A. N.....Duluth
Collins, H. C.....Duluth
Collins, J. S.....Wabasha
Colvin, A. R.....St. Paul
Comstock, A. E.....St. Paul
Condit, W. H.....Minneapolis
Conley, Alva A.....Cannon Falls
Conner, H. M.....Rochester
Conner, Wm. H.....St. Paul
Connor, C. E.....St. Paul
Conyngham, E. F.....Underwood
Cook, Henry Wireman Minneapolis
Cook, Paul B.....St. Paul
Cooney, H. C.....Princeton
Corbett, J. Frank....Minneapolis
Corniea, A. D.....St. Paul
Corrigan, J. E.....Spooner
Cory, W. M.....Waterville
Cosgriff, J. A.....Lamberton
Cosgrove, J. H.....Duluth
Cosman, E. O.....Minneapolis
Countryman, Roger S.....St. Paul
Courtney, Walter .....Brainerd
Covell, W. W.....St. Peter
Coventry, W. A.....Duluth
Cowern, E. W.....North St. Paul
Cowing, P. G.....Evansville
Crafts, Leo M.....Minneapolis
Craig, C. C....International Falls
Craig, Wm. McK.....Rochester
Crandall, William..Brown Valley
Cranmer, Richard R..Minneapolis
Crawford, Albert S.....Rochester
Cremer, M. H.....Red Wing
Crenshaw, J. L.....Rochester
Cress, E. E.....Boyd
Cress, P. J.....Ellsworth
Crewe, J. E.....Rochester
Croson, F. R.....Proctor
Cross, J. G.....Minneapolis
Crowe, J. H.....Virginia
Crowl, Verne C.....Bertha
Crume, Geo. P.....Minneapolis
Culligan, J. M.....Rochester
Curtin, John T.....Minneapolis
Cutts, G. A. C.....Litchfield
Cutts, George .....Minneapolis
Dack, Lloyd, G.....St. Paul
Dahl, Elmer O.....Minneapolis
Dahl, G. A.....Mankato
Dahl, John A.....Minneapolis
Dahlstrom, A. W.....Minneapolis
Daignault, O. .....Benson
Dailey, W. J.....Blooming Prairie
Daniel, Donald H.....Minneapolis
Daniels, J. W.....St. Peter
Danielson, K. A.....Litchfield
Darling, J. B.....St. Paul
Darrow, D. C.....Moorhead
Dart, Leslie O.....Minneapolis
Daugherty, E. B.....St. Paul
Daugherty, L. E.....St. Paul
Davis, B. F.....Duluth
Davis, F. U.....Faribault
Davis, Herbert .....St. Paul
Davis, H. S.....Duluth
Davis, Kenneth S.....Rochester
Davis, Lloyd T.....Wadena
Davis, William .....St. Paul
Davison, P. C.....Willmar
Dawswell, W. J.....Benson
De Boer, Hermann.....Edgerton
Dedolph, Karl .....St. Paul
Delmore, J. L.....Roseau
Dempsey, D. P.....Kellogg
Denman, A. V.....Mankato
Dennis, W. A.....St. Paul
Derauf, B. I.....Brainerd
Desjardins, Arthur W...Rochester
Dewey, G. W.....Fairmont
Dezell, Earl R. .....Minneapolis
Deziel, G. .....Minneapolis
Dickson, Thos. H., Jr.....St. Paul
Disen, C. F.....Minneapolis
Ditmeier, L. M. Gerber....Jasper
Dittman, Geo. C.....St. Paul
Dodge, F. A.....Le Sueur
Dohm, A. J.....St. Paul
Dolan, C. P.....Worthington
Dolder, F. C.....Eyota
Doms, H. C.....Slayton
Doms, Wm. .....Woodstock
Donaldson, C. A.....Minneapolis
Doolittle, L. E.....Duluth
Dorge, Richard I.....Minneapolis
Dornblaser, H. Bright Minneapolis
Douglas, H. E.....Blackduck
Douglass, J. E..State Sanatorium
Doxey, G. L.....Minneapolis
Doyle, George C.....Duluth
Doyle, J. B.....Rochester
Doyle, L. O.....Lindstrom
Drake, Carl B. .....St. Paul
Drake, C. R.....Minneapolis
Drake, F. A.....Lanesboro
Dredge, H. P.....Sandstone
Drenning, F. C.....Duluth
Driesbach, N. .....Minneapolis
Drips, D. G.....Rochester
Drought, W. W.....Fergus Falls
Dryden, F. M.....Crookston
Du Bois, J. A.....Sauk Center
Du Bois, J. F.....Sauk Center
Dubbe, F. H.....New Ulm
Dudley, J. H.....Windom
Dulude, S. .....Dassel
Dunlap, H. F.....Rochester
Dunlop, Alex .....Crookston
Dunn, Geo. Robt.....Minneapolis
Dunn, J. N.....St. Paul
Dunn, Louis .....Minneapolis
Dunsmoor, F. A.....Minneapolis
Durgin, F. L.....Nopeming
Dutton, C. E.....Minneapolis
Eager, B. F.....Rochester
Earl, George A.....St. Paul
Earl, Robert O.....St. Paul
Eberlin, E. A.....Glenwood
Ebert, Joseph William..Rochester
Eby, C. B.....Spring Valley
Eckstein, A. W.....Comfrey
Edwards, Ralph C.....Elysian
Egan, John M.....Minneapolis
Eggen, O. K.....Minneapolis
Ehmke, Wm. E.....Willow River
Eisengraeber, G. A..Granite Falls
Eisenman, W. G.....Chisholm
Eitel, G. G.....Minneapolis
Ekblad, J. W.....Duluth
Ekelund, C. T.....New Ulm
Eklund, Wm. J.....Duluth
Elias, F. J.....Duluth
Ellison, David E.....Minneapolis
Ellison, Frank E.....Monticello
Elsey, J. R.....Glenwood
Ely, O. S.....South St. Paul
Engberg, E. J.....St. Paul
Engh, Sigfred.....Cottonwood
Englehart, P. C.....Wood Lake
Eppard, R. M.....Cloquet
Erb, F. A.....Minneapolis
Ericson, J. G.....Minneapolis
Ericson, Swan.....LeSueur
Ernest, G. C.....St. Paul
Errickson, W. A.....Faribault
Ertel, E. Q.....Ellendale
Eshelby, E. C.....St. Paul
Esser, John.....Perham
Estrem, C. O.....Fergus Falls
Estrem, T. A.....Hibbing
Eusterman, G. B.....Rochester
Evarts, Arrah B.....Rochester
Everlof, J. L.....Minneapolis
Evert, J. A.....St. Paul
Ewing, C. F.....Wheaton
Fahey, E. W.....Duluth
Fansler, W. A.....Minneapolis
Farr, R. E.....Minneapolis
Farrish, R. C.....Sherburn
Fawcett, C. E.....Stewartville
Feidt, W. W.....Minneapolis
Ferguson, J. B.....St. Paul
Ferguson, J. C.....St. Paul
Fesler, Harold H.....St. Paul
Field, Merton.....Northfield
Figi, F. A.....Rochester
Fineman, S.....Rochester
Finney, W P.....Rochester
Fischer, H. P.....Shakopee
Fischer, O. F.....Houston
Fischer, P. M.....Shakopee
Fisher, J. M.....St. Peter
Fitzgerald, E. T.....Morris
Fjeldstad, C. Alford..Minneapolis
Fjellman, R. C.....Minneapolis
Fjelstad, C. Alford...Minneapolis
Flagstad, A. E.....St. Paul
Fleischhauer, D. S.....Wabasha
Fleming, A. S.....Minneapolis
Fleming, C. Filmore..Minneapolis
Fleming, James.....Cloquet
Flinn, B. P.....Redwood Falls
Flinn, T. E.....Redwood Falls
Flocken, Chas. F....Minneapolis
Flom, A. O.....Chisago City
Flores, O. T.....Dodge Center
Fogarty, Chas. W.....St. Paul
Foley, F. E. B.....St. Paul
Folken, F. G.....Albert Lea
Forbes, R. S.....Duluth
Ford, Frances A.....Rochester
Forrest, C. G.....Clearbrook
Foucar, H. O.....Rochester
Foulds, Gordon, S.....Rochester
Fowler, L. H.....Rochester
Fox, John M.....Minneapolis
Franchere, F. W....Lake Crystal
Franzen, H. G.....Minneapolis
Frasier, Geo. W.....Duluth
Frazer, E. B.....Rochester
Freeborn, J. A.....Fergus Falls
Freed, C. F.....Rochester
Freed, O. J. R.....Cokato
Freeman, C. D.....St. Paul
Freeman, Geo. H.....Willmar
Freeman, J. P.....Glenville
Freeman, W. L.....Foley
Freligh, E. O'B.....Stillwater
French, E. A.....Plainview
French, H. S.....Grove City
Friesleben, Wm....Sauk Rapids
Frisch, F. P.....Gibbon
Fritsche, Albert.....New Ulm
Fritsche, L. A.....New Ulm
Froelich, H. W..Thief River Falls
Frost, E. H.....Willmar
Fulton, J. F.....St. Paul
Furber, W. W.....Cottage Grove
Gaarde, F. W.....Rochester
Gager, E. C.....St. Paul
Gaines, E. C.....Buffalo Lake
Gallagher, B. J.....Waseca
Gamble, J. W.....Albert Lea
Gammell, J. H.....Minneapolis
Gardner, Edwin L....Minneapolis
Garvin, John Day.....Rochester
Gausemel, S. D.....Goodhue
Gauthier, W.....Virginia
Geer, Everett K.....St. Paul
Geissenger, John D.....St. Paul
Geist, Emil S.....Minneapolis
Geist, George A.....St. Paul
Gendron, J. F.....Grand Rapids
Gerber, Milo P.....Brainerd
Germo, Chas.....Balaton
Ghent, C. Harry.....St. Paul
Ghent, M. M.....St. Paul
Gibbon, L. L.....Lowry
Giere, E. O.....St. Paul
Giessler, Paul W.....Minneapolis
Giffin, H. Z.....Rochester
Gilbert, John D.....Carlton
Gilfillan, J. S.....St. Paul
Gillispie, N. H.....Duluth
Gilmore, R.....Bemidji
Ginsberg, Wm.....St. Paul
Giroux, A. A.....Duluth
Glyer, R. T.....Sunnyvale, Calif.
Goeckerman, W. H.....Rochester
Goehrs, H. W.....St. Cloud
Goltz, E. V.....St. Paul
Golden, C. M.....Tyler
Goodman, C. E.....Virginia
Goodson, Catherine M.....
Fergus Falls
Gordon, Geo. J.....Minneapolis
Gosin, D. F.....Minneapolis
Goss, Harold .....Minneapolis
Gosslee, G. L.....Moorhead
Gotham, C. L.....St. Paul
Gough, W. H.....Granada
Gowdy, R. A.....Alexandria
Graham, C.....Rochester
Graham, David.....Duluth
Graham, R. D.....Duluth
Graham, Robert.....Duluth
Granger, C. T.....Rochester
Granger, S. Booker.....Rochester
Gratzek, Thos.....St. Paul
Graves, C.....Aitkin
Graves, Floyd .....Minneapolis
Grawn, F. A.....Duluth
Gray, C. E.....Rush City
Gray, F. D.....Marshall
Greaves, Frederick C.....Duluth
Greeley, L. Q.....Duluth
Greene, Carl Hartley...Rochester
Greene, Charles L.....St. Paul
Green, E. K.....Minneapolis
Greenfield, W. J.....Rochester
Griffin, P. J.....Fertile
Grimes, H. B.....Madelia
Grise, W. B.....Austin
Groll, S. .....Minneapolis
Ground, H. T.....Virginia
Gruenhagen, Arnold P....St. Paul
Guilford, H. M.....Minneapolis
Guide, W. C.....St. Cloud

Gullixson, A. ..... Albert Lea
Gunderson, Harley J. Minneapolis
Gunderson, Nels A. Minneapolis
Gunz, A. N. ..... Center City
Guyer, L. A. ..... St. Paul
Habein, Harold C. Minneapolis
Hacking, Frank H. Minneapolis
Haessley, S. B. ..... Faribault
Hagaman, Geo. K. ..... St. Paul
Hagen, G. L. ..... Minneapolis
Hagen, O. E. ..... Butterfield
Hagen, H. O. ..... New Richland
Hagen, O. J. ..... Moorhead
Haggard, G. D. ..... Minneapolis
Haight, G. G. ..... Audubon
Haines, J. H. ..... Stillwater
Haines, S. F. ..... Rochester
Halenbech, P. L. ..... Crosby
Hall, Andrea E. ..... Cusson
Hall, A. R. ..... St. Paul
Hall, J. M. ..... Minneapolis
Hall, P. M. ..... State Sanitorium
Hallberg, C. A. ..... Rochester
Halienbeck, D. F. ..... Rochester
Halloran, Walter ..... Jackson
Hallowell, W. H. ..... Minneapolis
Hamel, Arnold L. ..... Minneapolis
Hamel, C. E. ..... Minneapolis
Hamilton, A. S. ..... Minneapolis
Hammermeister, Theo. F. New Ulm
Hammes, E. M. ..... St. Paul
Hammond, J. F. ..... St. Paul
Hand, W. R. ..... Elbow Lake
Haney, C. L. ..... Duluth
Hansel, French Keller. Rochester
Hanson, A. M. ..... Faribault
Hanson, Erling ..... Minneapolis
Hanson, H. V. ..... Willmar
Hanson, Olga S. ..... Minneapolis
Hanson, W. Arthur ..... Rochester
Hare, E. R. ..... Minneapolis
Hardt, L. L. ..... Rochester
Harriman, L. ..... Howard Lake
Harrington, C. D. ..... Minneapolis
Harrington, S. W. ..... Rochester
Harrison, E. E. ..... West Concord
Hart, A. B. ..... Owatonna
Hartig, Hugo J. ..... Minneapolis
Hartman, H. R. ..... Rochester
Hartung, H. A. ..... LeSueur
Hartzell, Thos. B. ..... Minneapolis
Haskell, A. D. ..... Alexandria
Haskins, John L. ..... Northfield
Hathaway, S. J. ..... Champaign, Ill.
Haugan, O. M. ..... Fergus Falls
Hauge, M. M. ..... Clarkfield
Haugen, G. T. ..... Fergus Falls
Haverfield, Addie K. Minneapolis
Hawkins, E. P. ..... Montrose
Hawkins, V. J. ..... St. Paul
Hayes, J. M. ..... Minneapolis
Hayes, M. F. ..... Nashwauk
Head, G. D. ..... Minneapolis
Healy, R. F. ..... Pierz
Hearn, Wm. O. ..... Minneapolis
Heath, A. C. ..... St. Paul
Hedback, A. E. ..... Minneapolis
Hedblom, C. A. ..... Rochester
Hegge, C. A. ..... Austin
Hegge, O. H. ..... Austin
Heim, Russell R. ..... Minneapolis
Heimark, J. H. ..... Moorhead
Heimark, O. E. ..... Duluth
Heise, W. F. C. ..... Winona
Helk, H. H. ..... Minneapolis
Helland, G. M. ..... Spring Grove
Helland, J. W. ..... Spring Grove
Helmholz, H. F. ..... Rochester
Hempstead, B. E. ..... Rochester
Hemstead, Werner ..... St. Cloud
Hench, Philip S. ..... Rochester
Henderson, A. J. ..... Klester
Henderson, M. S. ..... Rochester
Hendrickson, J. F. ..... Minneapolis
Hengstler, W. H. ..... St. Paul
Henney, Wm. H. ..... McIntosh
Henriksen, H. G. ..... Elko
Henry, C. E. ..... Minneapolis
Hensel, C. N. ..... St. Paul
Henslin, A. E. ..... LeRoy
Herbst, William P. ..... Rochester
Herman, S. ..... Welcome
Herrmann, Edgar T. ..... St. Paul
Hertel, G. E. ..... Austin
Heseltine, Verner. Taylors Falls
Hesselgrove, S. S. ..... St. Paul
Heyerdale, O. C. ..... Rochester
Hiebert, J. P. ..... Minneapolis
Hielscher, Helen H. ..... Mankato
Hielscher, Julian A. ..... Mankato
Higgins, J. H. ..... Minneapolis
Hill, Eleanor J. ..... Minneapolis
Hilger, A. W. ..... St. Paul
Hilger, D. D. ..... St. Paul
Hilger, J. M. ..... Iona
Hilger, L. A. ..... St. Paul
Hirschboeck, F. J. ..... Duluth
Hirschfield, M. S. ..... Duluth
Hitchings, W. S. ..... Lakefield
Hoaglund, A. W. ..... Minneapolis
Hobbs, C. A. ..... Minneapolis
Hodge, S. V. ..... Minneapolis
Hodgson, H. H. ..... Crookston
Hoff, Alfred ..... St. Paul
Hoff, Peder A. ..... St. Paul
Hoffman, J. ..... Henning
Hoffman, Max H. ..... St. Paul
Hoidale, A. D. ..... Tracy
Hoiland, A. S. ..... Minneapolis
Hoit, E. E. ..... Detroit
Holbrook, J. S. ..... Mankato
Holcomb, J. T. ..... St. Paul
Holcomb, O. W. ..... St. Paul
Holdridge, Geo. ..... Foley
Holen, T. ..... Minneapolis
Holl, P. M. ..... Minneapolis
Hollands, W. H. ..... Fisher
Holm, Geo. A. ..... Minneapolis
Holm, H. H. ..... Glencoe
Holm, P. F. ..... Wells
Holman, C. J. ..... Mankato
Holman, E. E. ..... Pine River
Holmberg, L. J. ..... Canby
Holst, C. F. ..... Little Falls
Holst, J. B. ..... Little Falls
Holte, H. ..... Crookston
House, Z. E. ..... Cass Lake
Hovde, H. ..... Duluth
Howard, W. S. ..... St. Paul
Howe, A. W. ..... Minneapolis
Huenekens, E. J. ..... Minneapolis
Hughes, Louis D. ..... Minneapolis
Hullsiek, H. E. ..... St. Paul
Hultkrans, Joel C. ..... St. Paul
Humphrey, E. M. ..... Moorhead
Humphrey, W. R. ..... Stillwater
Hundling, H. W. ..... Rochester
Hunt, F. M. ..... Fairmont
Hunt, H. E. ..... St. Paul
Hunt, R. C. ..... Fairmont
Hunt, V. C. ..... Rochester
Hunte, A. F. ..... Truman
Hurst, M. M. ..... Grand Rapids
Hutchinson, C. J. ..... Rochester
Huxley, F. R. ..... Faribault
Hvoslef, Jakob ..... Minneapolis
Hyer, C. A. ..... Rochester
Hynes, James ..... Minneapolis
Hynes, John E. ..... Minneapolis
Ide, A. W. ..... St. Paul
Ikeda, Kano ..... Minneapolis
Irvine, H. G. ..... Minneapolis
Jackson, Geo. H., Jr. Rochester
Jacobs, A. C. ..... Elmore
Jacobs, John C. ..... Willmar
Jacobson, David J. ..... Russell
Jacquot, G. L. ..... Tyler
James, J. H. ..... Mankato
Jameson, Carol E. ..... Rochester
Jamieson, Earl ..... Walnut Grove
Jarvis, Bruce W. ..... Minneapolis
Jellison, E. R. ..... New Auburn
Jensen, J. C. ..... Hendricks
Jensen, T. J. ..... Duluth
Jensen, Louis C. ..... Minneapolis
Jenson, M. J. ..... Minneapolis
Jepson, P. N. ..... Rochester
Jesion, J. W. ..... St. Paul
Joannides, Minas ..... Minneapolis
Johnson, A. C. ..... Rochester
Johnson, A. E. ..... Minneapolis
Johnson, A. E. ..... Red Wing
Johnson, A. Elof. ..... Minneapolis
Johnson, Asa M. ..... St. Paul
Johnson, C. H. ..... Spring Valley
Johnson, C. M. ..... Dawson
Johnson, Ellsworth ..... Windom
Johnson, E. W. ..... Bemidji
Johnson, G. L. ..... Newfolden
Johnson, Hans ..... Kerkhoven
Johnson, Hartland C. ..... St. Paul
Johnson, H. M. ..... Dawson
Johnson, H. P. ..... Fairmont
Johnson, James A. ..... Minneapolis
Johnson, Julius ..... Minneapolis
Johnson, Nimrod ..... Minneapolis
Johnson, Odin J. ..... Minneapolis
Johnson, O. V. ..... Sebeka
Johnson, T. H. ..... St. Paul
Johnson, Walfred ..... Stillwater
Jones, A. W. ..... Red Wing
Jones, E. M. ..... St. Paul
Jones, H. T. ..... Rochester
Jones, H. W. ..... Minneapolis
Jones, Richard N. ..... Gaylord
Jones, W. A. ..... Minneapolis
Joseph, E. G. ..... Rochester
Joyce, G. T. ..... Rochester
Joyce, T. M. ..... Janesville
Judd, E. S. ..... Rochester
Judson, W. E. ..... Duluth
Juergens, H. M. ..... Sanborn
Kabrick, O. A. ..... Odin
Kahala, Arthur ..... Crookston
Kalmon, D. ..... Stillwater
Kamp, B. A. ..... Albert Lea
Kannary, E. L. ..... St. Paul
Kanne, C. W. ..... Faribault
Karn, B. R. ..... Ortonville
Kean, N. D. ..... Coleraine
Keeling, Louis F. ..... Lakefield
Keith, N. M. ..... Rochester
Kelly, B. W. ..... Aitkin
Kelly, John V. ..... St. Paul
Kelly, Paul H. ..... St. Paul
Kelly, Thomas C. ..... Mankato
Kelsey, C. G. ..... Hinckley
Kemp, A. F. ..... Mankato
Kennedy, C. C. ..... Minneapolis
Kennedy, Jane F. ..... Minneapolis
Kennedy, R. Ray ..... Minneapolis
Kennedy, W. A. ..... Minneapolis
Kent, George B. ..... Rochester
Kenyon, Paul ..... Wadena
Kerlan, S. Z. ..... McGregor
Kerrick, Stanley E. ..... Minneapolis
Kern, M. J. ..... St. Cloud
Kesting, Herman ..... St. Paul
Keyes, C. R. ..... Duluth
Keyes, E. D. ..... Winona
Kibbe, O. A. ..... Canton
Kiefer, M. A. ..... Sleepy Eye
Kierland, P. E. ..... Harmony
Kiesling, I. H. ..... Nashwauk
Kilbourne, A. F. ..... Rochester
Kimball, H. H. ..... Minneapolis
King, E. A. ..... Minneapolis
King, Walter E. ..... St. Paul
King, W. R. ..... Minneapolis
King, W. S. ..... Eveleth
Kingsbury, E. M. ..... Clearwater
Kinsella, Thomas J. ..... Minneapolis
Kirk, G. P. ..... East Grand Forks
Kirmse, Geo. W. ..... Minneapolis
Kirsch, R. L. ..... Crookston
Kistler, A. J. ..... Minneapolis
Kistler, A. S. ..... St. Paul
Kistler, C. M. ..... Minneapolis
Kittelson, Olof ..... Minneapolis
Kittelson, T. N. ..... Fergus Falls
Kjelland, J. S. ..... East Ellsworth, Wis.
Klein, Harry ..... Duluth
Klein, H. N. ..... St. Paul
Klima, W. W. ..... Stewart
Knauff, M. K. ..... St. Paul
Knickerbocker, F. H. ..... Staples
Knight, H. L. ..... Minneapolis
Knight, Ray Roberts. Minneapolis
Knight, Ralph T. ..... Minneapolis
Koch, John Charles. Minneapolis
Kohlbry, C. O. ..... Duluth
Kohler, G. A. ..... Minneapolis
Kohler, D. W. ..... St. Joseph
Kohler, F. G. ..... Hector
Koller, Herman M. ..... Minneapolis
Koller, L. R. ..... Minneapolis
Kolset, Carl D. ..... Benson
Koucky, J. D. ..... Rochester
Kraft, Peter ..... Duluth
Kramer, G. B. ..... St. Paul
Kriedt, Daniel ..... Minneapolis
Kreimer, Walter J. ..... Minneapolis
Kucera, Wm. J. ..... Minneapolis
Kuhlman, Aug. ..... Melrose
Kuth, J. R. ..... Duluth
Kvitrud, G. ..... St. Paul
Laird, A. T. ..... Nopeming
LaJoie, John M. ..... Minneapolis
Landeen, F. G. ..... Stillwater
Landenberger, Jno. New Prague
Lane, Laura A. ..... Minneapolis
Laney, R. L. ..... Puposky
Lange, A. E. ..... Rochester
Langenderfer, F. V. ..... St. Paul
Langhoff, A. H. ..... Glencoe
Lannin, J. C. ..... Mabel
Larsen, C. L. ..... St. Paul
Larson, M. L. ..... St. Paul
Larson, O. O. ..... Detroit
Laughlin, J. T. ..... Grey Eagle
La Pierre, C. A. ..... Minneapolis
Laurent, A. A. ..... Minneapolis
La Vake, R. T. ..... Minneapolis
Leahy, Bartholomew ..... St. Paul
Leavenworth, Richard O. St. Paul
Leavitt, H. H. ..... Minneapolis
Lebowski, Joseph A. Minneapolis
Leck, Clifford C. ..... Austin
Le Clerc, J. E. ..... LeSueur
Lee, W. A. ..... Fergus Falls
Lee, H. M. ..... Minneapolis

Lee, John W.....Minneapalis
Lee, Walter N.....Madison
Lee, W. P.....Northfield
Leibold, H. H....Parkers Prairie
Leicht, O.....Winona
Leigh, H. J.....Lakefield
Leitch, Archibald.....St. Paul
Leland, John T.....Herman
Leland, M. N.....Minneapolis
Lemon, W. S.....Rochester
Lenont, C. B.....Virginia
Lemstrom, Jari .....Minneapolis
Lepak, F. J.....Duluth
Lepak, John A.....St. Paul
Lerche, William.....St. Paul
Leuty, Amos .....Morris
Lewis, A. J.....Henning
Lewis, C. B.....St. Cloud
Lewis, E. J.....Sauk Center
Lewis, J. B.....South St. Paul
Lewis, J. D.....Minneapolis
Lewis, W. W.....St. Paul
Lexa, F. J.....Lonsdale
Libert, John.....St. Cloud
Lichtenstein, H. .....Winona
Liedloff, A. G.....Mankato
Lick, C. Louis.....St. Paul
Lillie, H. I.....Rochester
Lillie, W. F.....Rochester
Lima, Ludwig .....Montevideo
Lind, C. J.....Minneapolis
Linde, Herman .....Cyrus
Lindgren, E. I.....Duluth
Lindsay, W. V.....Winona
Linton, W. B.....Rochester
Lippman, Hyman S..Minneapolis
Litchfield, John T....Minneapolis
Litman, Samuel N..Meadowlands
Little, W. J.....St. Paul
Litzenberg, J. C.....Minneapolis
Locken, O. E.....Crookston
Lloyd, H. J.....Mankato
Logan, A. H.....Rochester
Logan, F. W.....Blue Earth
Logefeil, Rudolph C..Minneapolis
Lommen, P. A.....Austin
Long, Jesse .....Minneapolis
Long, W. H.....Rochester
Loofbourrow, Elias Homer.....
Keewatin
Loomis, E. A.....Minneapolis
Love, Fred A.....Carlos
Love, Geo. A.....Preston
Lowe, L. M.....Glyndon
Lowe, R. C.....Fairmont
Lowe, Thos. .....Pipestone
Lowe, Thos. A.....Slayton
Luden, Georgine .....Rochester
Luedtke, G. H.....Fairmont
Lufkin, H. M.....St. Paul
Lum, C. E.....Duluth
Lund, Theo. C.....Hutchinson
Lundgren, A. C.....Minneapolis
Lundholm, A. M.....St. Paul
Lynam, Frank .....Duluth
Lynch, J. L.....Winona
Lynch, M. J.....Minneapolis
Lyng, John .....Minneapolis
Lynn, J. F.....Waseca
Lysne, Henry .....Minneapolis
Lyons, H. R.....Rochester
Lyons, John H.....Rochester
Lyons, S. C.....Rochester
McCann, D. F.....Bemidji
McCarthy, Donald ....Minneapolis
McCartney, James L..Minneapolis
McCarthy, P. D.....Babitt
McCarthy, W. R.....St. Paul
McCarthy, W. J.....Madelia
McClanahan, J. H....White Bear
McClanahan, T. S....White Bear
McCloud, C. N.....St. Paul
McComb, C. F.....Duluth
McCorvie, J. E.....Rochester
McCoy, Mary .....Duluth
McCrea, James .....Fulda
McCuen, J. A.....Duluth
McDaniel, Orianna ...Minneapolis
McDavitt, Thos.....St. Paul
McDermott, T. E....Minneapolis
McDonald, A. E.....Minneapolis
McDonald, A. L.....Duluth
McDonald, D. A.....Minneapolis
McDonald, Irving C..Minneapolis
McDougald, D. W.....
Long Island, New York
McDowell, J. P.....St. Cloud
McEachran, A .....Minneapolis
McFarland, Albert R...Rochester
McFarland, A. H.....Minneapolis
McGiffert, E. N.....Duluth
McGroarty, J. J.....Easton
McGuigan, H. P.....Red Wing
McGuire, L. D.....Rochester

McHaffie, O. L.....Duluth
McHugh, Roderick F.....Aitkin
McIntire, H. M.....Waseca
McIntyre, E. H.....Virginia
McIntyre, Geo. .....Minneapolis
McIntyre, John A.....Owatonna
McKaig, Carle B.....Pine Island
McKeon, James.....St. Paul
McKeon, Owen.....St. Paul
McKeown, E. G.....Pipestone
McKibben, H. E.....St. Cloud
McKinley, C. A.....Minneapolis
McKinney, F. S.....Minneapolis
McLaren, Jennette M....St. Paul
McLaughlin, E. M.....Winona
McLaughlin, Jos. A..Minneapolis
McNevin, C. F.....St. Paul
McPheeters, H. O....Minneapolis
McVicar, Chas. S.....Rochester
MacLaren, Archibald....St. Paul
Macnie, J. S.....Minneapolis
Maertz, W. F.....New Prague
Magath, T. B.....Rochester
Magney, F. H.....Duluth
Maguire, Leo .....Minneapolis
Mahle, A. E.....Rochester
Maland, C. O.....Minneapolis
Malloy, J. F.....Rochester
Maloney, T. J.....St. Paul
Manley, J. R.....Duluth
Mann, A. T.....Minneapolis
Manson, F. M.....Worthington
Marcley, W. J.....Minneapolis
Marcum, E. H.....Bemidji
Mariette, Ernest .....Hopkins
Mark, Arthur E.....St. Paul
Mark, D. B.....Minneapolis
Martin, Edw. T.....Marble
Martin, T. R.....Duluth
Martineau, J. L.....St. Paul
Masson, D. M.....Rochester
Masson, J. C.....Rochester
Matchan, Glen R....Minneapolis
Mathews, Justus ....Minneapolis
Mattill, P. M.....Chisholm
Maxeiner, Stanley R..Minneapolis
May, C. E.....Minneapolis
May, C. G.....Adrian
May, W. H.....Minneapolis
Mayland, M. L.....Faribault
Mayo, C. H.....Rochester
Mayo, W. J.....Rochester
Mead, Marion .....Minneapolis
Mebane, Donald Cummins.....
Rochester
Meckstroth, C. W.....Brandon
Meeker, W. R.....Rochester
Meierding, Wm. A....Springfield
Meighen, J. W.....Ulen
Meilicke, W. A.....Nicollet
Meland, O. N.....Warren
Melby, Benedik .....
Blooming Prairie
Melby, O. F....Thief River Falls
Melson, Oliver C.....Rochester
Melzer, R. G.....Lyle
Merkert, G. L.....Minneapolis
Merrill, J. E.....Amboy
Merrill, U. H.....Rochester
Merriman, L. L.....Duluth
Mesker, G. H.....Olivia
Metcalf, F. W.....Fulda
Meyer, A. .....Melrose
Meyer, E. L.....Minneapolis
Meyerding, E. A.....St. Paul
Meyerding, H. W.....Rochester
Michael, J. C.....Minneapolis
Michaelson, H. E....Minneapolis
Milan, M. Geo..Thief River Falls
Miller, H. A.....Waseca
Miller, V. .....Mankato
Miller, W. A.....New York Mills
Mills, J. W.....Winnebago City
Millspaugh, J. G.....Little Falls
Mingo, F. E.....Hugo
Mitchell, Frederick.....St. Paul
Mitchell, J. I.....Rochester
Mitchell, R. S....Grand Meadow
Moench, Laura Mary..Rochester
Moersch, F. P.....Rochester
Moersch, H. J.....Rochester
Moffatt, A. G.....Howard Lake
Mogilner, S. N.....St. Paul
Moir, Wm. W.....Minneapolis
Molander, H. A.....St. Paul
Moloney, G. R.....Belleblaine
Monahan, J. A.....Minneapolis
Moore, A. B.....Rochester
Moore, T. D.....Rochester
Moorehead, M. B.....Minneapolis
Moran, Robert E.....Rochester
More, C. W.....Eveleth
Morehouse, G. G.....Owatonna
Moren, E. .....Minneapolis

Moriarty, Cecile R...Minneapolis
Mork, B. O.....Worthington
Morris, E. H.....Austin
Morris, R. Edwin.....St. Paul
Morrison, A. W.....Minneapolis
Morrissey, F. B.....St. Paul
Morse, John .....Minneapolis
Morse, M. P.....LeRoy
Morse, Russell W.....St. Paul
Morse, W. E. H.....Morristown
Morsman, L. W.....Hibbing
Morss, C. R.....Zumbrota
Mortenson, N. G.....St. Paul
Morton, H. McI.....Minneapolis
Moses, Joseph, Jr.....Northfield
Moss, Myer N.....St. Paul
Moynihan, A. F.....Sauk Center
Moynihan, T. J.....St. Paul
Murphy, E. F.....St. Paul
Murphy, F. J.....Minneapolis
Murray, D. D.....Duluth
Murray, W. R.....Minneapolis
Mussey, R. D.....Rochester
Myers, J. A.....Minneapolis
Myers, Thos. .....St. Paul
Naegeli, Frank.....Fergus Falls
Nagel, G. W.....Rochester
Nannestad, J. R.....Albert Lea
Nass, H. A.....Mabel
Nathanson, M. H....Minneapolis
Nauth, W. W.....Winona
Neher, F. H.....St. Paul
Nelson, C. P.....Owatonna
Nelson, E. H.....Chisholm
Nelson, H. E.....Crookston
Nelson, H. S.....Minneapolis
Nelson, L. A.....St. Paul
Nelson, M. S.....Spring Grove
Nelson, N. A.....Dawson
Nelson, Nesmuth .....Brainerd
Nelson, O. E.....Minneapolis
Nelson, O. N.....Battle Lake
Nesbit, Harold T.....Rochester
Neumann, C. A.....Lewiston
Neumann, W. H.....Lewiston
New, G. B.....Rochester
Newhart, Horace ....Minneapolis
Newman, G. A.....Stillwater
Nichols, A. E.....St. Paul
Nicholson, J. .....Brainerd
Nicholson, M. A.....Duluth
Nippert, H. T.....St. Paul
Nippert, L. A.....Minneapolis
Noonan, Dan F.....Minneapolis
Nootnagel, C. F.....Minneapolis
Noran, A. N.....Minneapolis
Nordin, C. G.....Brainerd
Nordin, G. T.....Minneapolis
Nordland, Martin ....Minneapolis
Norman, M. F.....Crookston
Norris, Edgar H.....St. Paul
Noth, H. W.....Minneapolis
Novak, E. E.....New Prague
Nusbaum, D. H.....Jackson
Nye, Katherine .....St. Paul
Nye, Lillian L.....St. Paul
O'Brien, H. J.....St. Paul
O'Connor, D. C....Eden Valley
O'Connor, J. B.....St. Paul
O'Connor, Patrick H....Amboy
O'Donnell, D. M.....Ortonville
O'Donnell, J. E.....Minneapolis
O'Hara, J. J.....Janesville
O'Leary, P. A.....Rochester
Oberg, C. M.....Minneapolis
Oerting, Harry.....St. Paul
Ogden, B. H.....St. Paul
Ogden, Warner .....St. Paul
Ohage, Justus .....St. Paul
Ohage, Justus, Jr.....St. Paul
Ohlinger, L. B.....Rochester
Ohnstad, J. .....McIntosh
Oliver, C. I.....Graceville
Olson, Albert E.....Duluth
Olson, Chas. A.....St. Paul
Olson, F. A.....Minneapolis
Olson, G. M.....Minneapolis
Olson, O. H.....Erskine
Olson, Olaf A.....Minneapolis
Olson, R. G.....Minneapolis
Olson, W. P.....Gaylord
Onsgard, C. K.....Halstad
Onsgard, L. K.....Houston
Opheim, O. V.....Starbuck
Oppegaard, M. O.....Crookston
Oredson, O. A.....Duluth
Orton, H. N.....Minneapolis
Osborn, Lida .....Mankato
Osburn, Burt F...Internat'l Falls
Ostergren, E. W.....St. Paul
Ott, William .....Rochester
Otto, H. C.....Frazer
Owre, Oscar .....Minneapolis
Pake, S. G.....Duluth

Palmer, W. L.....Albert Lea
Paradine, J. .....Duluth
Pardee, K. .....Rochester
Pare, L. T. .....Duluth
Parker, R. R. .....Rochester
Parker, H. L. .....Rochester
Parker, J. William.....Rochester
Parker, O. W. .....Ely
Parks, A. H. .....Minneapolis
Parrott, B. W.....Long Prairie
Parsons, G. E. .....Elk River
Passer, A. A. .....Olivia
Patterson, C. H.....Barnesville
Patterson, W. E.....Minneapolis
Patterson, W. E.....Westbrook
Patterson, W. L....Fergus Falls
Paulsen, E. L. .....Minneapolis
Paulson, C. W.....North Branch
Paulson, T. S. .....Fergus Falls
Payette, C. H. .....Duluth
Pearson, F. R. .....St. Paul
Pederson, A. H. .....St. Paul
Pederson, Harold ....Minneapolis
Pederson, R. M. .....Minneapolis
Peirson, Homer F. .....Austin
Pelant, F. J. .....New Ulm
Pemberton, J. de J....Rochester
Pengelly, E. J. .....Ironton
Penhall, F. W. .....Morton
Pennie, D. F. .....Duluth
Peppard, T. A. .....Minneapolis
Perry, C. G. .....St. Paul
Perry, Ralph St. John.....
Minneapolis
Persons, C. E. .....Marshall
Peterman, M. G. .....Rochester
Peters, R. M. .....Minneapolis
Petersen, J. R. .....Minneapolis
Peterson, Alfred .....Dassel
Peterson, Christian ....Owatonna
Peterson, H. E. .....Granite Falls
Peterson, O. H. .....Minneapolis
Peterson, R. A. .....Vesta
Peterson, Thorvald ..Minneapolis
Peterson, V. N. .....St. Paul
Peterson, Willard C...Minneapolis
Pettit, C. W. .....Minneapolis
Peyton, Wm. T. .....Minneapolis
Pfaff, E. K. .....Richmond
Phelps, Kenneth .....Minneapolis
Phelps, R. M. .....St. Peter
Phillips, A. E. .....Delano
Phillips, W. H. .....Jordan
Pierce, Chas. H. .....Wadena
Pilon, P. C. .....Paynesville
Pine, Auten A. .....St. Paul
Pineo, W. B. .....Minneapolis
Piper, M. C. .....Rochester
Piper, Wm. A. ....Mountain Lake
Plankers, A. G. .....Rochester
Platt, J. J. .....St. Paul
Plondke, F. J. .....St. Paul
Plonski, C. J. .....Faribault
Plummer, H. S. .....Rochester
Plummer, W. A. .....Rochester
Poehler, F. T. .....Minneapolis
Poirier, J. A. .....Forest Lake
Pollock, D. K. .....Minneapolis
Pollock, L. W. .....Rochester
Poppe, Fred H. .....Minneapolis
Portman, W. C. .....Jackson
Powell, L. D. .....Rochester
Power, J. E. .....Duluth
Powers, F. W. .....Barrett
Prangen, A. D. .....Rochester
Pratt, C. C. .....Mankato
Pratt, Fred J. .....Minneapolis
Pratt, J. A. .....Minneapolis
Preine, I. A. .....Minneapolis
Prim, J. A. .....Minneapolis
Pritchard, D. B. .....Winona
Proctor, O. S. .....Rochester
Proshek, Charles E. .Chicago, Ill.
Puffer, F. L. .....Bird Island
Pulford, DeLos Schuyler, Jr....
Rochester
Putney, G. E. .....Paynesville
Quigley, T. C. .....Owatonna
Quinby, Thomas F...Minneapolis
Quist, H. W. .....Minneapolis
Raadquist, C. S. .....Hibbing
Radabaugh, R. C. .....Hastings
Raihala, John .....Virginia
Rains, J. M. .....Willmar
Raiter, Franklin W. S....Cloquet
Ramsey, W. R. .....St. Paul
Randall, B. M. .....Graceville
Rankin, F. W. .....Rochester
Ransom, L. M. .....Hancock
Ratcliffe, J. J. .....Aitkin
Rathbun, A. M. .....Rice
Rathbun, C. A. .....Sauk Rapids
Ravu, Bjarne .....Minneapolis
Rees, S. P. .....Minneapolis
Reeve, E. T. .....Elbow Lake
Reineke, George F. .....New Ulm
Reinertson, B. R. .....Minneapolis
Reiter, H. W. .....Shakopee
Replogle, W. H. .....Wabasha
Reynolds, Hugh .....Hibbing
Reynolds, J. S. .....Minneapolis
Rhines, D. C. .....Caledonia
Rice, G. D. .....St. Cloud
Rice, G. E. .....Rochester
Richards, E. T. F. .....St. Paul
Richardson, Harold E....St. Paul
Richardson, W. E. .....Pipestone
Richardson, W. J. .....Fairmont
Richmond, Chas. D. .....Jeffers
Richter, E. H. .....Hunter, N. D.
Ridgeway, Alexander ...Belgrade
Ridgway, A. M. .....Annandale
Riggs, C. E. .....St. Paul
Rippert, J. A. .....Duluth
Rishmiller, J. H. .....Minneapolis
Risser, E. D. .....Winona
Ritchie, H. P. .....St. Paul
Rivers, A. B. .....Rochester
Rizer, R. J. .....Minneapolis
Roadman, I. M. .....Ponsford
Roan, Carl M. .....Minneapolis
Robb, Edwin F. .....Minneapolis
Robbins, C. P. .....Winona
Roberts, L. M. .....Little Falls
Roberts, Thos. S. .....Minneapolis
Roberts, W. B. .....Minneapolis
Robertson, A. W. .....Litchfield
Robertson, H. E. .....Rochester
Robertson, J. B. .....Cottonwood
Robertson, W. P. .....Litchfield
Robilliard, C. M. .....Faribault
Robilliard, W. H. .....Faribault
Robinson, J. M. .....Duluth
Robitshek, E. C. .....Minneapolis
Rochford, W. E. .....Minneapolis
Rockwood, Paul Reed..Rochester
Rodda, F. C. .....Minneapolis
Rodgers, C. L. .....Minneapolis
Rogers, F. D. .....St. Paul
Rogers, John T. .....St. Paul
Roholt, C. L. .....Waverly
Rood, D. C. .....Hibbing
Rose, J. T. .....Lakefield
Rosen, S .....Minneapolis
Rosenberry, B. P. .....Winona
Rosenow, E. C. .....Rochester
Rosenwald, R. M. ....Minneapolis
Rothenberg, J. C. .....Springfield
Rothrock, J. L. .....St. Paul
Rothschild, H. J. .....St. Paul
Rousseau, Victor.....Maple Lake
Rowe, O. W. .....Duluth
Rowe, Paul H. .....Minneapolis
Rowe, W. H. .....Minnneapolis
Rowntree, L. A. .....Rochester
Roy, J. A. .....Red Lake Falls
Roy, Philemon .....St. Paul
Rudie, P. S. .....Duluth
Ruhberg, Geo. N. .....St. Paul
Rumpf, C. W. .....Faribault
Rumpf, W. H. .....Faribault
Russell, H. R. .....St. Paul
Rutherford, W. C. .....St. Paul
Rutledge, L. H. .....Detroit
Ryan, John J. .....St. Paul
Ryan, J. W. .....Duluth
Rypins, Harold .....Minneapolis
St. Clair, G. G. .....Duluth
Sanderson, E. T. .....Minneota
Sanford, A. H. .....Rochester
Sargeant, H. L. .....Rochester
Satersmoen, Theo..Pelican Rapids
Sather, E. R. .....Alexandria
Savage, F. J. .....St. Paul
Sawatzky, Wm. A. ....Minneapolis
Sawyer, H. P. .....Red Wing
Schaaf, F. H. K. .....Minneapolis
Schaefer, S. .....Winona
Schatz, F. J. .....St. Cloud
Schefcik, J. F. .....Minneapolis
Scheldrup, N. H. .....Minneapolis
Scherer, C. A. .....Duluth
Schlesselman, George.....
Good Thunder
Schlesselman, J. T. .....Mankato
Schlutz, Fred W. .....Minneapolis
Schmidt, G. .....Lake City
Schmidt, W. R. .....Glencoe
Schmitt, A. F. .....Minneapolis
Schneider, Clarence L. .....
Deer Creek
Schneider, H. A. .....Jordan
Schoch, J. L. .....New Ulm
Schoch, R. B. .....St. Paul
Scholl, A. J. .....Rochester
Scholpp, O. W. .....Hutchinson
Schons, E. .....St. Paul
Schoonover, F. S. .....Rochester
Schottler, G. J. .....Dexter
Schroder, C. H. .....Duluth
Schuldt, F. C. .....St. Paul
Schultz, J. A. .....Albert Lea
Schulze, Albert G. .....St. Paul
Schussler, Otto F. .....Minneapolis
Schwartz, A. H. .....Duluth
Schwyzer, Arnold.....St. Paul
Schwyzer, G. .....Minneapolis
Scofield, C. L. .....Benson
Scott, J. W. .....St. Charles
Seaberg, J. A. .....Minneapolis
Seashore, D. E. .....Duluth
Seashore, Gilbert ....Minneapolis
Seed, Lindon .....Rochester
Seham, Max .....Minneapolis
Seifert, Otto J. .....New Ulm
Selle, Fred .....Winthrop
Senkler, G. E. .....St. Paul
Senn, E. W. .....Owatonna
Senty, E. G. .....Rochester
Sessions, John .....Minneapolis
Shaffer, Loren W. .....Rochester
Shannon, S. S. .....Crosby
Shannon, W. Ray.....St. Paul
Shapere, A. D. .....St. Paul
Shapiro, E. Z. .....Duluth
Shaw, A. W. .....Buhl
Sheldon, W. D. .....Rochester
Shellman, John L. .....St. Paul
Shelver, H. J. .....Ortonville
Sheppard, Fred .....Hutchinson
Sheppard, P. E. ....Hutchinson
Sherman, Carnot H. .....
Marine on St. Croix
Sherman, C. L. .....Luverne
Sherman, H. T. .....Franklin
Sherping, O. Th. .....Fergus Falls
Sherwood, G. E. .....Kimball
Shimonek, Anton.....St. Paul
Shipley, H. M. .....Adams
Shrader, E. E. .....Watertown
Shrader, J. S. .....Springfield
Shulean, Nellie S. .....Cambridge
Silvernale, F. P. .....Elmore
Simison, C. W. .....Hawley
Simon, B. F. .....St. Paul
Simon, Geo. H. .....St. Paul
Simons, Jalmar .....Minneapolis
Simpson, E. D. .....Minneapolis
Simpson, J. D. .....Minneapolis
Sistrunk, W. E. .....Rochester
Sivertsen, Andrew ....Minneapolis
Sivertson, Ivar .....Minneapolis
Skinner, H. O. .....St. Paul
Slater, S. A. .....Worthington
Slocumb, J. A. .....Plainview
Slocumb, Maude S. ....Minneapolis
Slyfield, F. F. .....Duluth
Smallwood, J. T. ....Worthington
Smersh, F. M. .....Owatonna
Smersh, J. F. .....Owatonna
Smiley, K. E. .....Rochester
Smith, A. M. .....Minneapolis
Smith, Arthur .....Minneapolis
Smith, B. A. .....Crosby
Smith, F. D. .....Kasson
Smith, F. L. .....Rochester
Smith, Homer R. .....Minneapolis
Smith, John F. .....Minneapolis
Smith, L. G. .....Montevideo
Smith, M. W. .....Red Wing
Smith, Norman, M...Minneapolis
Smith, P. A. .....Faribault
Smith, Wm. H. .....Cass Lake
Snell, Albert M. .....Mankato
Sneve, Haldor .....St. Paul
Snyder, G. W. .....St. Paul
Snyder, J. W. .....Rochester
Soderlind, A. .....Minneapolis
Sogge, L. .....Windom
Sohlberg, Olof .....St. Paul
Sohmer, A. E. .....Mankato
Souba, Fred J. .....Minneapolis
Spicer, F. W. .....Duluth
Sprafka, J. M. .....St. Paul
Spratt, C. N. .....Minneapolis
Sprunt, William H. ....Rochester
Spurbeck, R. G. .....Cloquet
Stacey, L. J. .....Rochester
Staley, J. C. .....St. Paul
Stanley, C. R. .....Worthington
Staples, H. L. .....Minneapolis
Stark, W. B. .....Rochester
Steen, A. H. .....Cottage Grove
Steffens, L. A. .....Red Wing
Steiner, I. W. .....Winona
Stemsrud, A. A. .....Dawson
Sterner, E. G. .....St. Paul
Sterner, O. W. .....St. Paul
Steven, Geo. .....Byron
Stevens, F. A. .....Lake Elmo
Stevens, J. B. .....Rochester
Stewart, Alexander.....St. Paul

Stewart, A. B.....Owatonna
Stewart, C. A.....Minneapolis
Stewart, L. A. S.....
Ottawa, Ontario, Canada
Stewart, O. E.....Bemidji
Stewart, R. I.....Wendell
Stierle, Adolph, Jr.....St. Paul
Stinnette, S. E.....St. Paul
Stokes, J. H.....Rochester
Stolpestad, H. L.....St. Paul
Stomel, Joseph .....Minneapolis
Stowe, A. J.....Rush City
Strachauer, A. C.....Minneapolis
Strathern, F. P.....St. Peter
Strathern, M. L.....Gilbert
Strickler, A. F.....Sleepy Eye
Strickler, Mary.....Sleepy Eye
Strickler, O. C.....New Ulm
Strobel, W. G.....Duluth
Strout, E. S.....Minneapolis
Strout, G. Elmer.....Minneapolis
Struthers, J. E.....Rochester
Stuart, A. B.....Cloquet
Stuhr, Henry C.....Minneapolis
Stuhr, J. W.....Stillwater
Sturre, J. R.....Watkins
Sukeforth, L. A.....Duluth
Sundt, M. .....Minneapolis
Sutherland, C. G.....Rochester
Sutherland, H. N.....Ely
Sutton, Chas. S.....St. Cloud
Sutton, L. F.....Mazeppa
Swan, Theo. S.....Rochester
Swanson, Edwin O.....St. Paul
Swanson, Roy E.....Alexandria
Swartwood, F. A.....Waseca
Sweeny, Arthur .....St. Paul
Sweetman, R. H.....Sauk Center
Sweetser, H. B.....Minneapolis
Sweetser, Theodore ..Minneapolis
Sweitzer, S. E.....Minneapolis
Swendseen, Carl J....Minneapolis
Swenson, Charles .....Braham
Sybilrud, H. W.....Bricelyn
Szlapka, T. J.....Rochester
Taft, John O.....Minneapolis
Taft, Walter L.....Minneapolis
Tanner, A. C.....Minneapolis
Taylor, A. C.....Duluth
Taylor, C. W.....Duluth
Taylor, H. L.....St. Paul
Taylor, Rood .....Minneapolis
Taylor, R. V.....Rochester
Taylor, Wm. H.....Pipestone
Teisberg, C. B.....St. Paul
Tennyson, Theo. .....Minneapolis
Ternstrom, O. H.....St. James
Thabes, J. A.....Brainerd
Theissen, W. H.....Faribault
Thimsen, N. C. Blooming Prairie
Thomas, David Owen.....
Minneapolis
Thomas, Geo. E.....Minneapolis
Thomas, Geo. H.....Minneapolis
Thomas, Gilbert J....Minneapolis
Thompson, Albert.....St. James
Thompson, H. H.....Minneapolis
Thompson, V. C.....Stillwater
Thordarson, Theo. .....Minneota
Thornby, H. J.....Moorhead
Thorson, E. O.....Luverne
Thysell, F. A.....Moorhead
Tibbetts, M. H.....Duluth
Tiber, L. J.....St. Paul
Tiedeman, I. D.....Heron Lake
Tierney, C. M.....Granger
Tilderquist, D. L.....Duluth
Tilton, Albert J.....Alden
Tingdale, A. C.....Minneapolis
Tofte, Josephine ....Minneapolis
Torkelson, P. T.....Lyle
Towers, F. E.....Minneapolis
Traeger, C. A.....Faribault
Tuohy, E. L.....Duluth
Turnacliff, D. D.....Minneapolis
Turnbull, F. M.....Duluth
Tweedy, G. .....Winona
Tyrrell, C. C.....Minneapolis
Ulrich, Henry L.....Minneapolis
Ulrich, Mabel S.....Minneapolis
Undine, A. Clyde.....Minneapolis
Urberg, S. E.....Duluth
Utley, J. O. Glendale, California
Valentine, W. H.....Tracy
Van Norman, R. H.....St. Paul
Van Slyke, Chas. A.....St. Paul
Van Valkenburg, B. F.....
Long Prairie
Vercellini, C. E.....Duluth
Vercellini, G.....St. Paul
Vigen, J. G.....Fergus Falls
Vik, A. Elliott.....Big Lake
Vinson, P. P.....Rochester
Vogel, Jos. H.....New Ulm
Vogtel, Melvin A....Minneapolis
Vollum, E. O.....Albert Lea
Von Berg, J. P.....Albert Lea
Von Bohland, F. J....Belle Plaine
Von der Weyer, Wm....St. Paul
Von Lackum, W. H....Rochester
Voyer, Emile O.....Minneapolis
Vrooman, F. E.....St. Francis
Wagener, H. P.....Rochester
Wald, R. H.....St. Paul
Waldie, Geo. McL.....Wadena
Waldron, Carl W....Minneapolis
Walker, A. E.....Duluth
Walker, C. C.....Raymond
Walker, G. H.....Minneapolis
Waller, Jas. D.....Wilmont
Wallinga, John H.....St. Paul
Walters, B. Frank.....St. Paul
Walters, Franklin R..Moose Lake
Walters, H. W.....Rochester
Wanous, E. Z.....Minneapolis
Ward, A. W.....Minneapolis
Ward, Percy A.....Minneapolis
Warham, T. T.....Minneapolis
Warner, E. F.....St. Paul
Warren, C. L.....LeRoy
Warren, E. L.....St. Paul
Warren, F. S.....Faribault
Warren, J. W.....Faribault
Warwick, Margaret.....St. Paul
Watson, A. M.....Royalton
Watson, C. W.....Minneapolis
Watson, F. G.....Worthington
Watson, J. A.....Minneapolis
Watson, John D.....Holdingford
Watson, Tolbert .....Albany
Wattam, G. S.....Warren
Way, O. F.....Claremont
Webb, R. C.....Minneapolis
Webber, Edward E.....Proctor
Webster, H. E.....Duluth
Weeks, L. C.....Detroit
Weir, J. D.....Beardsley
Weir, J. F.....Rochester
Weirick, Howard R.....Hibbing
Weiser, F. R.....Windom
Weiser, Geo.....New Ulm
Weisman, S. A.....Minneapolis
Welch, M. C.....St. Paul
Wellcome, J. W. B....Sleepy Eye
Welles, H. J.....Minneapolis
Wentworth, A. J.....Mankato
Werner, N. L.....Red Wing
Werner, O. S.....South Haven
Westby, Nels .....Madison
Weston, C. G.....Minneapolis
Wethall, A. G.....Minneapolis
Weum, T. Wm.....Minneapolis
Wheeler, M. W.....St. Paul
Whetstone, Mary ....Minneapolis
Whitacre, J. C.....St. Paul
Whitcomb, Ed. H.....St. Paul
White, J. B.....Belleplaine
White, J. S.....St. Paul
White, Marx S.....Minneapolis
Whitmore, F. W.....St. Paul
Whitney, A. W.....St. Paul
Wilcox, Archa E.....Minneapolis
Wilcox, F. L.....Walker
Wilcox, M. Russell...Minneapolis
Willcut, Clarence ....Minneapolis
Wilder, R. M.....Rochester
Wilhelm, L. F. X.....Rochester
Wilkins, J. A.....Rochester
Wilkinson, Stella .....Duluth
Will, W. W.....Bertha
Williams, Clayton.....St. Paul
Williams, John.....Lake Crystal
Williams, Hugh O..Lake Crystal
Williams, L. A.....Slayton
Williams, Robert ....Minneapolis
Williams, R. J.....Pine River
Williams, R. V.....Rushford
Willius, F. A.....Rochester
Willson, Hugh S.....Minneapolis
Wilson, C. E.....Blue Earth
Wilson, Clarence E.....Dakota
Wilson, L. B.....Rochester
Wilson, Warren .....Northfield
Wilson, W. F.....Lake City
Winberg, O. K.....Lake Park
Winnick, J. B.....St. Paul
Winter, J. A.....Duluth
Wiseman, R. L.....Pine City
Witham, C. A.....Minneapolis
Witherstine, H. H.....Rochester
Withrow, M. E.....
International Falls
Wittich, F. W.....Minneapolis
Wohlrabe, A. A.....Minneapolis
Wold, K. C.....St. Paul
Wolner, Oscar H.....Gilbert
Woltman, H. W.....Rochester
Wood, Douglas F.....Minneapolis
Wood, H. G.....St. Paul
Woodard, F. R.....Minneapolis
Woodworth, Elizabeth .....
Minneapolis
Woodworth, L. F.....
Le Sueur Center
Woolway, C. J.....Deerwood
Workman, H. M.....Tracy
Workman, W. G.....Tracy
Wray, W. E.....Campbell
Wright, C. B.....Minneapolis
Wright, C. Darcy....Minneapolis
Wright, C. O.....Luverne
Wright, Franklin R.....
Minneapolis
Wyatt, O. S.....Minneapolis
Wynne, H. M. N.....Minneapolis
Ylvisaker, L. S.....St. Paul
Yoerg, C. M.....Minneapolis
Young, V. A.....Duluth
Zander, C. H.....St. Paul
Zaworske, E. A.....Minneapolis
Zeien, Thos.....North Branch
Zierold, A. A.....Minneapolis
Zimbeck, R. D.....Maynard
Zimmerman, H. B.....St. Paul
Ziskin, Thomas .....Minneapolis

Honorary Members

Beard, R. O.....Minneapolis
Chesley, A. J.....Minneapolis
Erdmann, C. A.....Minneapolis
Jackson, C. M.....Minneapolis